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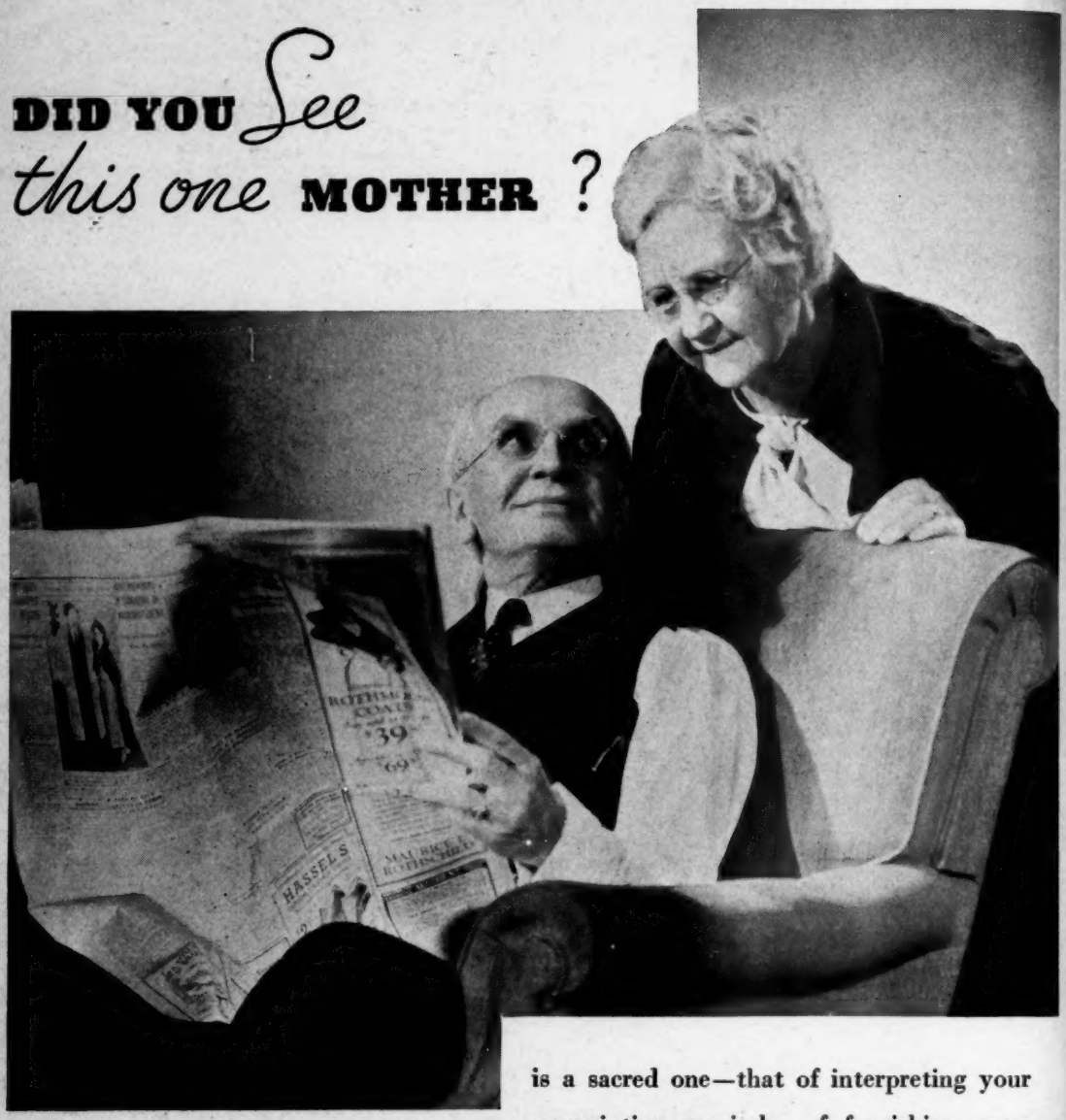

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 18 MAY, 1935 NUMBER 5

THE PATHOGENESIS OF SOME INTRAOCULAR OSSEOUS TISSUE TRUE METAPLASIA IN THE EYE

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ST. LOUIS

True metaplasia, or the transformation of tissue of one embryonic type into tissue belonging to another type, has generally been considered as nonexistent, post partum. In the following article, the findings in several cases are described, in which true connective tissue has been developed from pigmented epithelial cells of the retina and of the ciliary body. The commonly observed bone and fat along the inner surface of the choroid are shown in some of these cases to have been produced in connective tissue of ectodermal origin. From the Department of Ophthalmology, Washington University School of Medicine. Read before the American Ophthalmological Society, at Lucerne-in-Quebec, July 11, 1934.

This paper will attempt to show that the formation of bone, commonly found in old inflamed eyeballs along the inner surface of the choroid and less often in the same relation to the ciliary body, is developed in a considerable degree within connective tissue derived in the first position from the retinal pigment epithelium and in the second from the pigmented epithelium of the ciliary body.

Maximow[1] wrote that bone was the most highly differentiated tissue of the connective substances and that in its production, the interstitial, fibrillar, collagenous substance became infiltrated with calcium salts.

Leriche and Policard[2] stated that there was only one basic mode of bone formation and that this occurred in four phases: first, the connective tissue became edematous, due to a defective and scanty circulation and to a stagnation of fluid in the tissue spaces; second, an increase in the number of the connective tissue fibrils; third, a homogeneous preosseous substance occurred in the modified connective tissue; and last, a rapid impregnation of the preosseous structure with calcium salts. These authors observed no direct relation between osteogenesis and the presence of osteoblasts.

Virchow[3] as early as 1847 mentioned the deposition of lime into fibrous connective tissue and serous membranes; he wrote that the same process led to the formation of bone within connective tissue as within cartilage.

After an extensive clinical and experimental study on the heteroplastic formation of bone, Poscharissky[4] concluded that bone might develop in any organ of the human body whenever all of the following conditions were present: first, a necrosis of the tissue or at least a sclerosis of so intensive a degree that an incrustation with lime salts occurred; second, a progressive drying of the calcified masses which tended to take on the composition of amyloid; third, the development of granulation tissue containing blood vessels in the vicinity of the focus.

Since the essential preliminary to the formation of bone is the presence of sclerosed and poorly vascularized connective tissue lying near tissue with a good blood supply, it is necessary now to consider the origin of such connective tissue within the eyeball.

Metaplasia includes both the transformation of one type of tissue into another type and the production of tissue by cells which normally produce tissue of another kind. The latter form of metaplasia, according to Mann[5], occurs in the fourth and sixth months of fetal life by the development of the sphincter pupillae and the dilator pupil-

lae muscles, respectively, from the neural ectoderm in the outer layer of the optic cup or secondary optic vesicle. The only other example of a similar change in the body is the development from the outer ectodermal layer, in the eighth month of fetal life, of the arrectores pilorum or the muscles elevating the hairs of the skin. These three formations are definite examples of mesodermal-tissue structures being derived from ectodermal cells. In addition, it must also be kept in mind that almost all of the epithelial structures in the kidneys and genital apparatus are of mesodermal origin. Subsequent to the birth of the individual, however, there occurs no metaplasia in any part of the human organism except in the eye. In other words, ectoderm always produces ectodermal structures and mesoderm always forms mesodermal tissues after fetal development is completed except in the case of the two ocular changes now to be considered. The simplest form of metaplasia in the eye is the formation of true collagenous tissue in the so-called anterior capsular cataract from the proliferation of the anterior epithelium of the lens, a derivative of the outer skin-ectoderm. The more complicated second instance of ocular metaplasia is the production of connective tissue from hyperplasia of the retinal and ciliary epithelia, derived from the neural ectoderm of the optic cup. The presence of a mass or layer of dense collagenous tissue under the retina or along the inner surface of choroid and of the ciliary body is not uncommon in old inflamed eyeballs. The presence of connective tissue in these regions has generally been explained as due to the organization of inflammatory exudate or hemorrhage from the choroid, retina, or from the ciliary body. Thus Ginsberg[6], who reviewed the pathology of the uvea in 1928 for the great series of Henke and Lubarsch on human pathology, wrote that in acute uveitis, masses of exudate after being deposited upon the ciliary body and upon the choroid may become organized into dense connective tissue, containing few cells and blood vessels and that in chronic uveitis, there frequently lay upon the choroid more or less pigmented masses of connective tissue; in all this new-formed connective tissue, associated with both the acute and chronic uveitis, the deposit of lime salts and the formation of bone frequently occurred. Coats[7] was of the opinion that in his exudative retinitis the most characteristic change, or the mass of connective tissue between the retina and choroid, was due to the organization of hemorrhage coming from the outer layers of the retina. Many other citations from the literature could be given for the same formation of connective tissue from the organization of exudates along the inner surface of the ciliary body and of the choroid. Inflammatory exudates that can be organized, however, rarely proceed from the choroid in either the acute or chronic form of uveitis; on the contrary. such exudates are common along the inner surface of the orbiculus ciliaris in both the acute and chronic conditions. E. Fuchs[8], stated that whereas toxin-containing fluid and leucocytes could easily penetrate the retina from the choroid, it did not appear conceivable that lymphocytes could enter the retina through an intact pigment epithelium. On the other hand, lymphocytes and macrophages as well as pus cells must be freely able to pass from the vascular layer of the ciliary body inwards to the free surface of the pars plana.

Coming now to the production of connective tissue in the eye from epithelial cells, this process has been mentioned by several of the most distinguished writers in ophthalmology. Thus, Axenfeld,[9] after pointing out that masses staining like connective tissue arose from proliferation of the epithelium of the lens capsule in the production of capsular cataract, stated, in describing the anatomic findings in a case of central external exudative retinitis with bone formation, that in many places one obtained the impression of a transition of the proliferated pigmented epithelium into "connective tissue" processes. Leber[10], while discussing the process of retraction in the production of retinal detachment, through the contraction of a cellular membranous layer of tissue on

the inner surface of the retina, stated that he was persuaded that this cellular membrane was derived from the pars ciliaris and the pigment epithelium. In other pathologic processes, where the pigment epithelium was essentially involved, there frequently occurred the new formations of a connective-tissue-like substance, which appeared to be derived from pigment epithelium. The same author wrote under exudative retinitis (Coats) that at least a part of these new formations of tissue upon the inner surface of the choroid appeared to be derived from the pigment epithelium. E. v.Hippel[11], in reporting the anatomic findings in several eyeballs of young children, where the differentiation between angiomatosis retinae and retinitis exudativa (Coats) was very difficult, discussed the origin of a thick mass of dense tissue (Schwarte) between the choroid and retina in the macular region of two of them. This homogeneous tissue was found to contain cells which appeared elongated and resembled the corneal corpuscles or the cells of a capsular cataract; most of these cells contained fuscin in varying degrees, frequently in considerable amounts. It was the author's opinion that the latter point strongly indicated the derivation of this entire tissue from the pigment epithelium. He added that this conception of the macular masses of dense tissue being derived in many cases from the pigmented epithelium had already been expressed several times. It must be admitted that the testimony of these observers was somewhat qualified as regards the metaplasia of epithelial cells into fibroblasts. There could be found in the literature but one definite statement to the fact of this process and that was made fifty-two years ago; we shall return later to this reference.

The eyeballs for the present study have been generally fixed in 10-percent formalin, imbedded in celloidin and the sections stained with hemotoxylin-eosin and Verhoeff's elastic-tissue stain combined with Van Gieson's method for collagen. Mallory stated that the acid-fuchsin of Van Gieson's mixture colored only the coarser fibers of collagen. For that reason, tissue primarily fixed in formalin was in some instances later mordanted in Zenker's fixative, imbedded in paraffin, and the sections stained by a combination of Masson's trichrome method with Mallory's aniline blue.

For the demonstration of the origin of connective tissue from pigmented epithelial cells, it is best to study incipient processes first. In our cases, such foci occur more frequently at and near the ora serrata. A few of these cases will next be briefly described.

Example of pigmented epithelial-cell processes and the new formation of connective tissue extending inwards from the ora serrata in a case of diffuse external exudative retinitis. Case 610. The clinical and pathological findings in this case were reported by Dr. E. P. North and Dr. Vincent L. Jones in the Journal of the Missouri State Medical Association, 1932, v. 29, p. 443. In the left eye of a white boy, 11 years old, there was observed a complete detachment of the retina with numerous small hemorrhages in it. Transillumination of this eye revealed, inferiorly, several opaque striae extending inwards from about the depth of the ora serrata. A complete general examination was negative. Because of the possibility of an intraocular neoplasm, the eyeball was removed.

Anatomic findings: The primary and essential disturbance in the eye was a diffuse external exudative retinitis (Coats) as shown by a diffuse thickening with albuminous and edematous fluids. The uveal tract was generally atrophic and contained very little cellular infiltration. Anteriorly, inside the swollen and detached retina and posteriorly lying along the inner surface of the choroid adjoining the optic nerve were small and large masses of homogeneous, poorly vascularized connective tissue; to much of the connective tissue at the latter situation, the retina was closely adherent. In the midst of these masses at several places, were centers of softening, containing cholesterine crystal spaces and deposits of lime salts, exactly as Coats[7] described. At the ora serrata, inferiorly, proliferated pig-

mented epithelium had extended considerably inwards into the swollen substance of the detached retina, explaining the presence of the opaque striae, observed in transillumination.

Fig. 1 (Lamb). Case 610. Section through part of dense, homogeneous connective tissue near the choroid, showing proliferated retinal pigmented epithelial cells, pigmented spindle-shaped cells, and young fibroblasts.

This hyperplasia of pigmented epithelial cells at the ora serrata occurred in thin lamellae or fingerlike processes extending inwards for greatly varying distances. Adjoining the ends of these

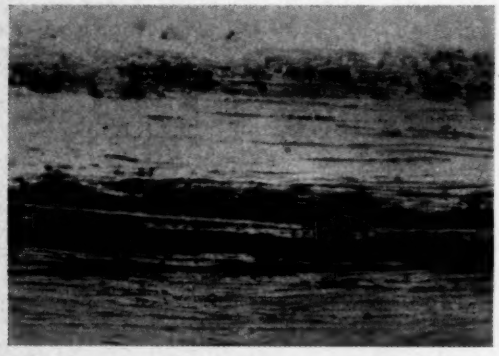

Fig. 2 (Lamb). Case 771. Section through layer of dense, homogeneous connective tissue lying over the ora serrata, showing along its outer surface proliferated retinal pigmented epithelial cells and on its inner surface dense numbers of macrophages; some of the latter are dark colored from iron pigment, derived from hemorrhage under the retina.

pigmented epithelial processes lay varying thicknesses of dense connective tissue of a homogeneous character and poorly vascularized. A few fibroblasts in this connective tissue were arranged with their flat surfaces directed anteriorly and posteriorly. Near the tips of the pigmented epithelial processes, there could easily be identified cells in all stages of change from pigmented epithelial through pigmented spindle-shaped cells to fibroblasts. The adjoining part of the choroid contained a localized dense infiltration with small lymphocytes and plasma cells. The same kind of metaplasia, from pigmented epithelial cells to fibroblasts and connective tissue, could be frequently followed, adjoining and inside the connective-tissue masses, within the detached retina, at the anterior part of the eye; in this location, the pigmented retinal epithelium had obviously invaded the retina proper, before the detachment took place. Pigmented epithelial cells were infrequent in relation to the thick masses of connective tissue lying along the inner surface of the choroid near the optic nerve. This condition indicated that here the process was older. Nevertheless in a few places near the choroid, cells representing the transitional stages from retinal pigmented epithelial cells to fibroblasts could be observed. These masses of connective tissue also had been derived from proliferation of the retinal pigment epi-

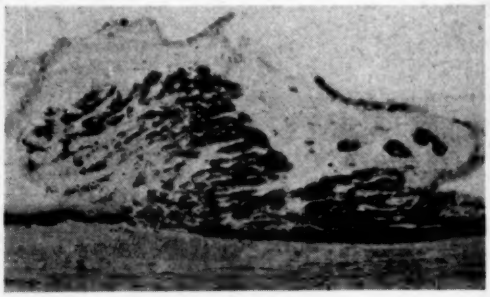

Fig. 3 (Lamb). Case 574. Section through a small nodule projecting from the inner surface of the orbiculus ciliaris, composed of considerable proliferated pigmented ciliary epithelium and dense, homogeneous connective tissue, and lined by unpigmented ciliary epithelium.

thelium. There were seen in places between these connective-tissue masses near the optic nerve and the adjoining choroid, doubling and tripling of the pigmented epithelium and tubular processes of the pigmented epithelium in the outer part of the masses, as Coats[7] described in his cases of external exudative retinitis.

Example of a flattened strip of proliferating pigmented epithelium and newformed connective tissue lying along the inner surface of the orbiculus ciliaris posteriorly and of the anterior part of the choroid in a case of primary diffuse external exudative retinitis. Case 771. In the right eye of a boy, twelve years old, the vision was found by Dr. H. L. Wolfner to be 15/300. Consider-

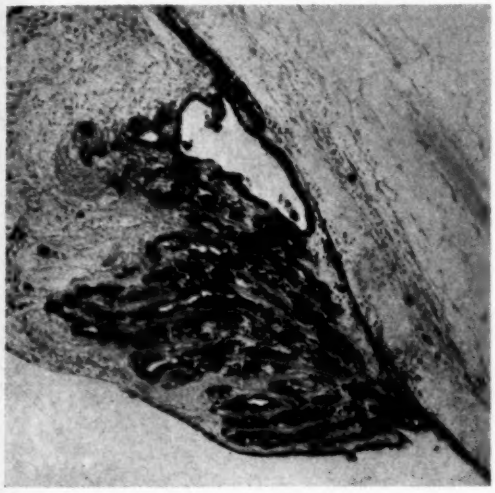

Fig. 4 (Lamb). Case 872. Section through part of the ora serrata, showing pigmented epithelial-cell processes, extending internally into the detached retina and capped internally by a thin layer of dense, homogeneous connective tissue.

able floating material was present in the vitreous. Eleven years later, a well-developed cataract in this eye was needled by another specialist. This operation was followed by inflammation and glaucoma. Enucleation of the eye was performed by Dr. Meyer Wiener when the patient was twenty-six years old, because of intense pain in the eye.

Anatomic findings: The retina was generally thickened in a moderate degree by albuminous and edematous fluids. The diffuse exudative retinitis which had probably been primary, led to the complete detachment of the ret-

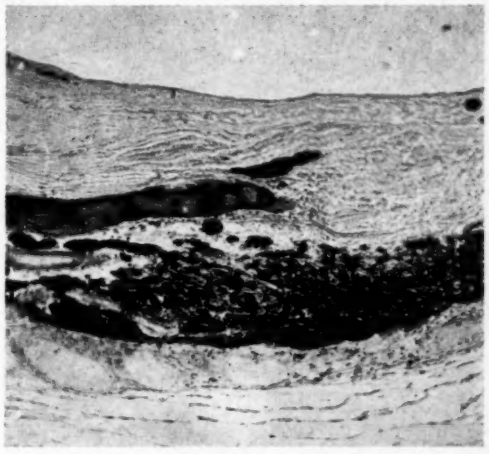

Fig. 5 (Lamb). Case 872. Section through proliferated tissue on the inner surface of the choroid, just behind the ora serrata, composed of a thick layer of proliferated retinal pigmented epithelium and a thick layer of dense, homogeneous connective tissue, containing a thin disc of bone in its outer part.

ina and in places to the detachment of the unpigmented ciliary epithelium from the posterior part of the ciliary body. A considerable number of red

Fig. 6 (Lamb). Case 558. Section through large globular mass of dense, homogeneous connective tissue adjoining the choroid, showing at its outer border, short lengths of proliferated retinal pigmented epithelium and in other portions extensive deposits of lime salts and many small spicules of bone.

blood cells were present in the albuminous fluid under the retina and under the unpigmented ciliary epithelium. The irritating subretinal fluid could have been the cause according to E. Fuchs[12], of the intensive atrophy with sclerosis, of the stroma of the iris, which led to considerable ectropion of the posterior pigmented layers of the iris and of the sphincter pupillae muscle. This atrophic iris was unique in being almost completely covered on both its anterior and posterior surfaces by an outer layer of endothelium and its accompanying secreted cuticular or glass-membrane, similar to Descemet's membrane. The glaucoma was due to these changes in the iris, which had produced a complete closure of the iritic angle. The ciliary body and choroid were atrophic with almost no cellular infiltration. The optic nerve was almost completely atrophic and showed deep glaucomatous cupping.

Where the unpigmented ciliary epithelium was detached along with its homologue, the retina, the exposed pigmented retinal epithelium anteriorly and the pigmented ciliary epithelium posteriorly showed an extensive expanse of proliferation, covered internally by a varying thick layer of dense homogeneous connective tissue. In this connective tissue, lay numerous young and mature fibroblasts with their flat surfaces directed internally and externally. In the external part of the layer of connective tissue were present numerous spindle-shaped pigmented cells. Wandering cells derived from intact retinal pigment epithelium had gathered in the subretinal fluid, particularly near the ora serrata. Most of these wandering cells had lost their melanin pigment; a few of the latter acting as macrophages had taken up free iron pigment, derived from the red blood cells under the retina. Many of these unpigmented wandering cells and some filled with iron pigment had become deposited upon the inner surface of the layer of homogeneous connective tissue. At the latter place, many of the unpigmented macrophages were associated with numerous young fibroblasts and a few thin striae of connective tissue, running anteroposteriorly. There was present no other source than the pigmented epithelial cells for all the cells and connective tissue in this newformed layer. Only a little round-cell infiltration occurred in the adjoining choroid and vascular layer of the ciliary body. The lamina vitrea was apparently intact; its interlamellar connective tissue was irregularly thickened and consisted of hyaline collagenous tissue.

Example of a small flattened nodule or excrescence, composed of proliferating pigmented ciliary epithelium and dense homogeneous connective tissue lying on the inner surface of the orbiculus ciliaris at about its middle. Case 574. Thirteen years before its enucleation, the left eye of a man, twenty years old, was struck by a blow from a fist. Following this, vision in the eye was light perception for one year and thereafter the eye was totally blind. Enucleation was performed because of long-continued pain.

Anatomic findings: The eyeball was atrophic and shrunken in a moderate degree. Although only part of this eye was available for sectioning, it could be determined that the iris was largely in apposition with the cornea and that the retina had been completely detached before the eye was removed. The uveal tract was atrophic; only the iris contained a moderate degree of infiltration with plasma cells. The lens had apparently been lost from the eye when the latter was first opened. Many small and a few large drusen extended into the subretinal space from the inner surface of the choroid. The optic nerve was considerably atrophied, a small amount of glaucomatous cupping being present.

The nodule projecting from the inner surface of the pars plana of the ciliary body was largely covered by a continuation of the unpigmented ciliary epithelium. Many processes of the pigmented ciliary epithelium in the form of thin striae extended through most of the nodule. Dense homogenous connective tissue with a few small capillaries lay closely arranged between the pigmented epithelial-cell processes. Many pigmented spindle-shaped cells and young fibroblasts were present in the

nodule. The derivation of the fibroblasts from the pigmented ciliary epithelial cells was unmistakable. In places, the unpigmented ciliary epithelial cells seemed to have proliferated into fibroblasts. The adjoining part of the vascular layer of the ciliary body was mildly infiltrated with plasma cells. The elastic lamina was generally intact and the interlamellar collagenous tissue was irregularly thickened and hyaline.

Example of a thick layer of proliferated pigmented epithelium of the retina and new-formed connective tissue with a thin spicule of bone on the inner surface of the choroid just posterior to the ora serrata. Case 872. At two years of age, a boy was brought to Dr. R. C. Smith of Superior, Wis., because of a large penetrating wound in the cornea of the left eye from a piece of tin. An iridectomy of the prolapsed iris was immediately performed. Following this, the eye gradually shrank and remained injected pericorneally. The eyeball was removed eight years after the accident.

Anatomic findings: The eyeball was considerably shrunken. The anterior chamber was almost entirely obliterated by flat adherence of the iris to the cornea. A thick pupillary membrane continuous on one side with a thin iritic membrane was present. The iris, ciliary body, and choroid were atrophic, sclerosed, and contained a mild infiltration with small lymphocytes and plasma cells. The lens injured in the accident had been replaced by an extensive thin disc of bony trabeculae, enclosing groups of swollen lens fibers. At least part of this bone had been derived from connective tissue lying in a cyclitic membrane. Both layers of the pars ciliaris retinae showed hyperplasia at the orbiculus ciliaris. A thin shell of bone, located just internal to the lamina vitrea of the choroid, lined the posterior part of the eye for a considerable expanse around the optic nerve. The retina, thickened with edematous and albuminous fluids, was completely detached. The optic nerve was only partially atrophic. The extensive focus, which showed a process, active in the production of connective tissue and bone from retinal pigmented epithelium, lay just behind the ora serrata. Proliferation of the pigmented epithelium had produced externally in this focus a thick layer composed of closely set striae of pigmented epithelium. More internally, the epithelial cells in these striae became spindle-shaped and lost their pigment. Internal to the proliferated striae of pigmented epithelium, lay a varying thick layer of dense homogeneous connective tissue, containing externally only a few young fibroblasts. The thin disc of bone lay in the connective tissue, anteriorly and close to the pigmented epithelial striae. Close to the bone lay small capillaries and many young fibroblasts; some of the latter were probably osteoblasts. In some sections, where the disc of bone did not extend so far anteriorly, there lay in its place and considerably more internal a thick, very dense mass of homogeneous connective tissue. The latter probably represented the preosseous tissue of Leriche and Policard[2]. Anteriorly, the retina was closely adherent to the inner part of the new-formed connective tissue. The inner surface of the connective tissue was lined by a single layer of flattened unpigmented epithelial cells. This layer was similar to and continuous with the layer lining the inner surface of the choroid, just behind the focus. The latter had probably proliferated anteriorly to form the lining over the focus.

Just at the ora serrata, on the opposite side of the eye, an intensive proliferation of the pigmented epithelium into the retina was capped internally by a small amount of dense homogeneous connective tissue. The latter process was entirely similar to that described in the first case studied (610).

The formation of the shell of bone around the optic nerve had occurred too long previously to demonstrate its origin. Nevertheless just adjoining the optic nerve on each side, there was observed a small amount of proliferation of the retinal pigment epithelium, associated with small masses of dense, homogeneous connective tissue.

Example along the inner surface of the choroid and in the detached part of

the retina of masses of long-standing dense homogeneous connective tissue, in the largest of which masses, there were seen a preliminary deposit of lime salts and a later formation of spicules of bone. This method of bone formation is unlike that described by Leriche and Policard[2]. Case 558. A young man, thirty years old at the time the left eye was enucleated by Dr. Walter Stevenson of Quincy, Ill., had been shot in this eye while hunting, eighteen years previously. The eye was removed because it was totally blind, much shrunken, at times inflamed and because of photophobia in the fellow eye. After enucleation of the eye, a bullet was removed from the posterior lateral part of the considerably contracted eyeball, lying just internal to the ciliary body and choroid.

Anatomic findings: The iris, ciliary body, and choroid were atrophic and contained a small degree of infiltration with small lymphocytes and plasma cells. The lens consisted of a thin saucerlike disc, showing a considerable deposit of lime salts. An extensive and thick anterior capsular cataract showed centrally much impregnation with calcium salts. Thin layers of dense connective tissue lay solidly between the lens internally and the iris and ciliary body, externally. This tissue became continuous behind the lens with a varying thick cyclitic membrane. The latter was closely and extensively adherent, posteriorly, to the partially detached retina. The contraction of the cyclitic membrane had principally produced the partial detachment of the retina, ciliary body, and choroid. Both layers of the pars ciliaris retinae showed hyperplasia in a considerable degree.

The pigmented epithelium of the retina was nowhere present as a single intact layer of cells. It presented at the ora serrata an intensive proliferation, forming long fingerlike processes extending inwards. Dense homogeneous connective tissue was present in places, between these lengths of pigmented epithelium. Just behind the ora serrata, considerable hyperplasia of the pigment epithelium was manifest by several additional layers and irregular processes just inside the lamina vitrea. More posteriorly, the pigment epithelium was absent or present in groups of several short lengths, irregular processes, or several broken layers. The masses of dense homogeneous connective tissue along the inner surface of the lamina vitrea showed only a comparatively small amount of proliferated pigmented epithelium, inside or around them. To the inner side of this connective tissue, lay spicules and networks of bone. In one very large globular mass of connective tissue, adjoining the choroid and in a similar one in the detached retina, there were observed large areas containing deposits of lime salts. In these areas, net works of bone were apparently in the process of development. The retina was split on each side because of its adherence to the networks of bone and its later subjection to the pull of the cyclitic membrane. The many small and large masses of homogeneous connective tissue in the detached retina were associated with many small groups of pigmented epithelial cells. Some of these masses of connective tissue contained thin membranes of modified elastic tissue, adjoining short lengths of the pigment epithelium. From the latter, the modified elastic tissue must have been derived. The lamina vitrea was generally intact.

The retinal blood vessels were generally thickly sclerosed. The optic nerve was completely atrophic.

Example of extensive networks of bony trabeculae with large interspaces containing fat cells located along the inner surface of the choroid, anteriorly showing their origin in connective tissue, lying adjacent to hyperplastic pigmented epithelium of the retina. Case 1323. A colored boy, when three years old, stuck a piece of wood into his eye. The penetrating wound in the cornea healed and all injection in the eye disappeared fairly quickly. After a period of ten years, attacks of pain in the eye became frequent. At the time of the enucleation, when the patient was thirteen years old, the eye was contracted and the vision zero.

Anatomic findings: The eyeball was much shrunken and atrophic. A broad column of cicatricial tissue marked the passage of the penetrating piece of

wood through the nasal side of the anterior chamber, the iris, and the lens; more posteriorly, it became continuous with a connective-tissue membrane extending across the eye at about the level of the ora serrata and derived mainly from the completely detached retina but partly from the ciliary body. Imbedded in connective tissue just behind the ora serrata on the nasal side, was a small particle of wood, impregnated with yellowish granular masses of hematoidin and showing cholesterine-crystal spaces; the entire focus was surrounded by foreign-body giant cells. The ciliary body and choroid were partly detached. The iris, ciliary body, and choroid were atrophic with only a scanty infiltration with small lymphocytes and plasma cells. Both layers of the pars ciliaris retinae showed simple hyperplasia.

The retinal pigment epithelium no longer existed as a single intact layer; instead it appeared in broken short lengths; anteriorly, these short lengths occurred in several layers. More posteriorly, these lengths of pigmented epithelium became fewer. Even over the anterior part of the choroid, the amount of connective tissue lying between the proliferated pigment epithelium and the bone was small. This connective tissue remaining after bone had formed, occurred in thin strata of a homogeneous nature with numerous thin fibroblasts between the layers. The lamina vitrea, although considerably wrinkled, was apparently intact.

In the anterior part of the detached retina occurred several large masses of homogeneous connective tissue, inclosing or being partly surrounded by short lengths of pigmented epithelium. Cells in the various stages from pigmented epithelial cells to fibroblasts could be observed. In some of these connective-tissue masses and frequently lying in apposition with lengths of pigment epithelium were thin membranes of a modified elastic tissue; the latter must also be considered as products of these aberrant retinal pigmented epithelial cells.

All the retinal blood vessels were sclerosed; those in the anterior part of the detached retina were frequently surrounded by pigmented epithelial cells; blood vessels in the posterior part of the retina generally showed a deposit of calcium salts in their walls. The optic nerve was completely atrophic.

The findings in the next eyeball were those of long-standing networks of bony trabeculae along the inner surface of the choroid, with interspaces containing dense collections of bone-marrow cells as well as numerous fat cells. Case 1053. The eye was totally blind at birth, sixty-two years before its removal by Dr. Howard C. Knapp of East St. Louis, Ill. The fellow eye had been normal until it developed glaucoma, for which it was removed when the patient was fifty years of age.

Anatomic findings: The eye was much shrunken. The uveal tract was atrophic, sclerosed, and showed little cellular infiltration. The lens capsule had apparently been broken, for the liquefied anterior part of the lens contained many red blood cells and pus cells. A thick and dense anterior capsular cataract was present centrally on the anterior surface of the lens. Posterior and lateral to the partially liquefied lens nucleus, lay irregularly scattered deposits of lime salts.

The retinal pigment epithelium was entirely absent or occurred as broken short lengths of one to several layers. Only a small amount of dense homogeneous connective tissue could be observed, occasionally associated with these proliferated lengths of pigment epithelium at the anterior part of the choroid on one side. All the remainder of the connective tissue in this relation had become osseous and fatty tissue. The lamina vitrea of the choroid was apparently intact. The retina was very irregularly split, part being detached and part remaining closely adherent to the bony trabeculae. All the retinal blood vessels were considerably sclerosed; many of these vessels were surrounded in part or entirely by pigmented epithelial cells. Many small amylaceous bodies were present in the retina. The retina was considerably thickened with albuminous fluid. The primary change in this eye may have been a prenatal exudative retinitis.

The writer was unable to find in his

cases any eyeball showing a development of bone in connective tissue, that was definitely derived from pigmented ciliary epithelium. The presence of bone along the inner surface of the ciliary body is very rare. The crucial part of the metaplasia, however, is the production of connective tissue from the pigmented ciliary epithelial cells; this we have already demonstrated.

After the writer was convinced as to the fact of this metaplasia of connective tissue and bone from pigmented epithelial cells, he found that similar conclusions had been reported in 1882 by W. A. Brailey and Gama Lobo[13]. W. A. Brailey was the Hunterian Professor of the Royal College of Surgeons in 1885-1886 and Curator of the Royal London Ophthalmic Hospital Museum from about 1875-1882. These authors wrote that bone, developed on the inner surface of the lamina vitrea, may lie in the midst of the proliferated pigment epithelial layer. Such cases are not uncommon in wounds and perforated ulcers of long standing. In such cases, the origin of the bone from the proliferated pigment epithelium is beyond doubt. And we may say the same with regard to the hard nodules or bony plates which are sometimes found in or on the external layers of the detached retina.

Summary

True metaplasia, or the formation of connective tissue from epithelium of ectodermal origin, occurs in the human eyeball. The anatomic findings are reported for several eyeballs, in which could be observed the various stages in the change to fibroblasts from pigmented epithelial cells of the ciliary body and of the retina. In regard to the unpigmented ciliary epithelium, no attempt was made here to study its possible participation in this metaplasia. Its unpigmented cells were obviously much more difficult to follow through any changes. The connective tissue, derived through hyperplasia of the pigmented ciliary and pigmented retinal epithelia, was always dense and homogeneous, having few fibroblasts and few blood vessels. This connective tissue occurred in layers along the inner surface of the ciliary body under the unpigmented epithelium, along the inner surface of the choroid and in globular masses within the detached retina. In the writer's cases, proliferation of the pigment epithelium and the production of connective tissue from it is encountered more frequently at and near the ora serrata. Unless the connective tissue is of long standing, it is always associated with numerous groups of pigmented epithelial cells, lying within or around the connective tissue. The participation of the choroid and vascular layer of the ciliary body in this metaplasia apparently consists only in furnishing, in the vicinity of the dense connective tissue, a good supply of blood; the latter, as above mentioned, is one of Poscharissky's[4] essential factors for the development of bone. The choroid and ciliary body in all the cases described were atrophic but may show infiltration with small round cells in a focal manner, adjacent to the areas of metaplasia. The lamina vitrea was generally intact but no claim is made for its complete integrity. For that matter, where the retina is undetached, it would not be impossible for fibroblasts to come from around the retinal blood vessels. The claim for metaplasia, however, is made solely upon a study of the individual pigmented epithelial cells.

The production of bone in this dense, homogeneous connective tissue adjacent to the good blood supply in the choroid occurred in the case of one eye of this series with the apparent formation of the preosseous connective tissue mold of Leriche and Policard[2]. In another case, spicules of bone developed at various places in areas of this connective tissue, showing a primary diffuse deposit with lime salts; the latter method will recall Poscharissky's[4] essential factors again. Osseous tissue in the human eyeball can after a long time form true bone marrow with numerous bone-marrow cells.

Grateful acknowledgement is due to Dr. H. A. McCordock, Associate Professor of Pathology, Washington University School of Medicine, for the very excellent photomicrographs to illustrate this paper.

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A FACTOR IN THE PRODUCTION OF DIVERGENCE INCREASE WITH NEAR VISION

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The divergence maximum of 96 pairs of eyes was measured by noting the greatest prism, base in, through which binocular single vision could be maintained when the test object was held 5 M. 50, 33, and 25 centimeters from the base line of convergence.

It was found that the maximum possible divergence of the optic axes of the eyes is greater when the eyes accommodate for a short distance than for a longer one. The divergence is proportional to that portion of the entire accommodative power which is used for the distance of fixation. This is demonstrated by the practical identity of the graphs representing the two functions of each of 79 of the 96 patients who were studied. Read before the American Ophthalmological Society at Lucerne, Canada, July, 1934.

If one places a prism, base in, in front of one eye, binocular single vision can be maintained by bringing about a divergence of the visual axes. There is a limit to the magnitude of prism that can be overcome, which in normal individuals is believed to vary between 4 and 8D. If, however, the object of fixation is placed near to the eyes, a greater divergence becomes possible. When the eyes must use most of their accommodative power to bring the object of fixation into clear focus, the increase of divergence is generally greater than when only little effort is needed.

This suggests that the act of accommodation is a stimulus to divergence or an inhibition to convergence. We have no absolute unit of measurement for either divergence or convergence. These two functions seem to be antagonistic. Whenever divergence is attempted, it may be resisted by more or less convergence. The amount of divergence which is actually accomplished may depend not only on the patient's power of divergence alone, but also on the amount of resistance offered to this divergence. However, if the act of accommodation is a factor in determining the resultant divergence of the visual axes, the divergence measured at various distances should be proportional to the fraction of the total accommodative

power used at the distance at which divergence is measured.

To test this hypothesis, data were gathered from one hundred consecutive patients. The divergence power was measured at 5 meters, 50, 33, and 25 centimeters, and the near point of accommodation was determined. The values were then plotted as curves, the ordinates of which are the reciprocal of the distance at which the measurements were made, expressed in meters. The abscissae are proportionate respectively to the divergence power expressed in centrads and to that portion of the total accommodative power used at the distance at which the divergence power was measured. All eyes that were within a range arbitrarily selected as normal were used, only those were excluded in which vision was less than 20/20 or in which there was hyperphoria, heterotropia, spherical ametropia corrigible by more than 2D, or astigmatism corrigible by more than 1D. When ametropia existed, measurements were made with the correcting lens in place in an accurately adjusted trial frame.

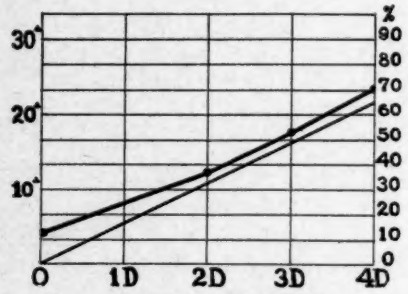

Figure 1 (Haessler).

The heavy line with four dots along its course represents a graph of the actual observation of the divergence power measured when the object of observation is 5 meters, 50 centimeters, 33 centimeters, and 25 centimeters, respectively, from the eyes. At these distances an accommodative effort is made which adds to the refraction of the eye 0, 2, 3, and 4 diopters. The narrow straight line represents the calculated fraction of the total accommodative power used at the time of measurement.

On the following three pages the data on 96 patients are presented in the form of graphs plotted in the same manner. They are reduced in size and all lettering has been omitted so that many could be printed on one page in order to facilitate comparison. In 79 of these graphs the two curves are sufficiently identical in their course to permit the assumption that they express a direct correlation of the facts in question. From this one may conclude that in these 79 cases in which correspondence of the curves was adequate, the impulse to accommodate influenced the balance between the mechanisms of divergence and convergence in such a way as to increase the divergence of the visual axis.

It remains to discuss why the degree of correspondence of the two curves, which in no case are precisely identical, is considered adequate and why no correspondence at all is observed in 17 of the patients.

The grosser variations from correspondence of the two curves is accounted for by the fact that we are not dealing with a unified material. Many of the patients probably did not have perfect muscle balance—a fact for the judgment of which we had no criteria within the limits of the premises postulated by this study. Also, there are probably factors other than accommodative impulse that increase the relative divergence. In most instances, however, the divergence factor is quantitatively the predominant one, so that it may overshadow these other unknown factors. Only in the exceptional case may other, unknown factors possibly summate to such a degree that they outweigh the accommodative factor. The large proportion of the entire material in which the curves are for all practical purposes identical demonstrates that after all the accommodative factor is really the most effective one. Many of the curves can be improved by adding or subtracting from the divergence measurements the value of an exophoria or esophoria that exists when accommodation is relaxed. However, giving individual treatment to some of the curves different from the entire material would imply an understanding of those relationships of muscle function which the data themselves are to elucidate.

This would therefore destroy the value of the data as a demonstration of the relationship.

As for the minor variations from identity of the graphs, several factors are obvious. The divergence power is actual change in the refractive state of the optical system is not proportional to the nervous impulse. This is more probably true near the limits of the accommodative range and it is here that the graphs are most variable.

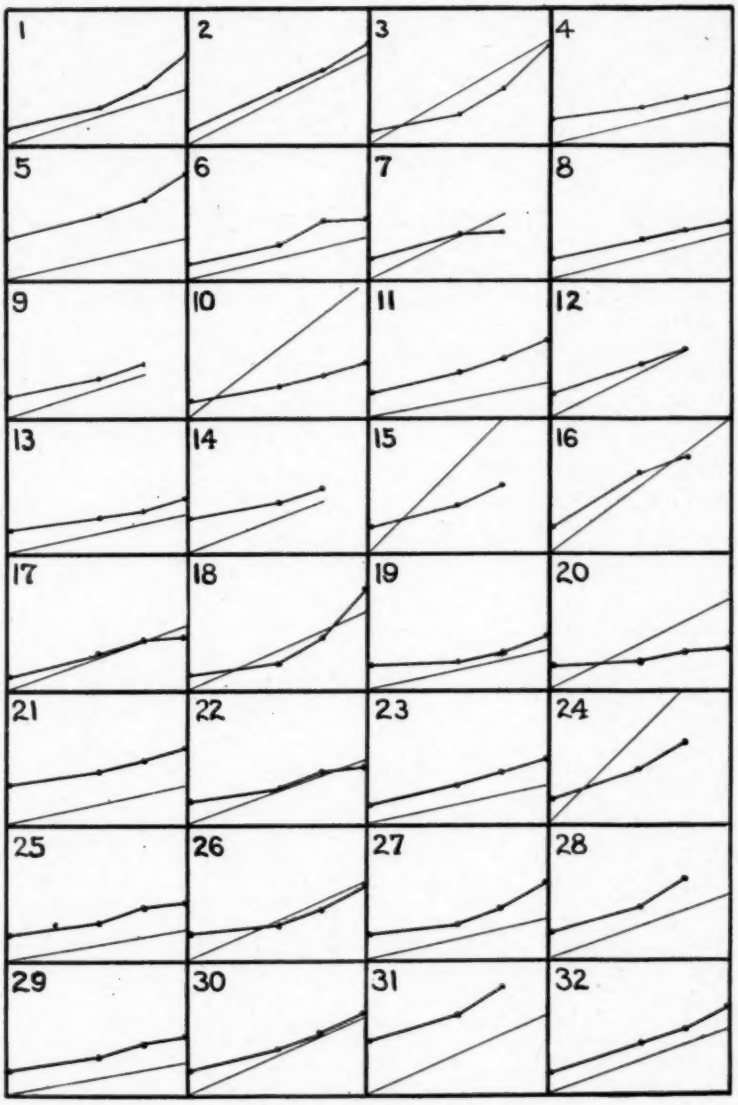

Figure 2 (Haessler).

measured very grossly. When we use one centrad as a unit in measuring a quantity whose total is only 6 to 8 centrads, we cannot expect a smooth curve. In some cases it is possible that the patient's observation of the diplopia was not accurate. It is also possible that the

When we conclude that the impulse to accommodate is quantitatively a stimulus to divergence (either directly or indirectly by relaxing convergence) it must not be understood to be a simple direct stimulus in the sense of applying an electric current to a nerve, or even

using light as a stimulus to cause the pupil to contract. It is rather a complex supranuclear function. This is probably a postural reflex which is gradually impulse to accommodate is associated with increased convergence. However, there is nothing in the data presented in the study to explain the paradox.

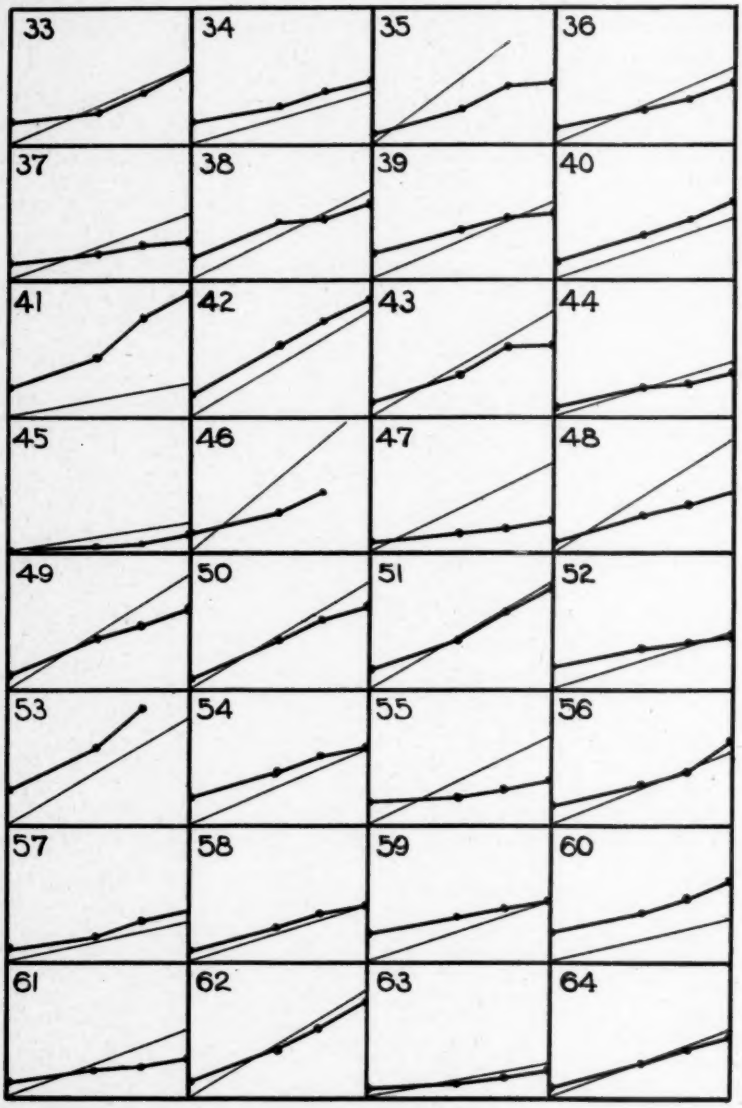

Figure 3 (Haessler).

modified as the accommodative power changes in the course of years, but not instantly with change in accommodative power that can be brought about by the use of spherical lenses.

The data readily explain the exophoria observed in presbyopia. They are at variance with the belief that the

Summary

It was found that the maximum possible divergence of the optic axes of the eyes is greater when the eyes accommodate for a short distance than for a longer one. The divergence is proportional to that portion of the entire accommodative power which is used for

the distance of fixation. This is demonstrated by the practical identity of the graphs representing the two functions in each of 79 of the 96 patients which were studied.

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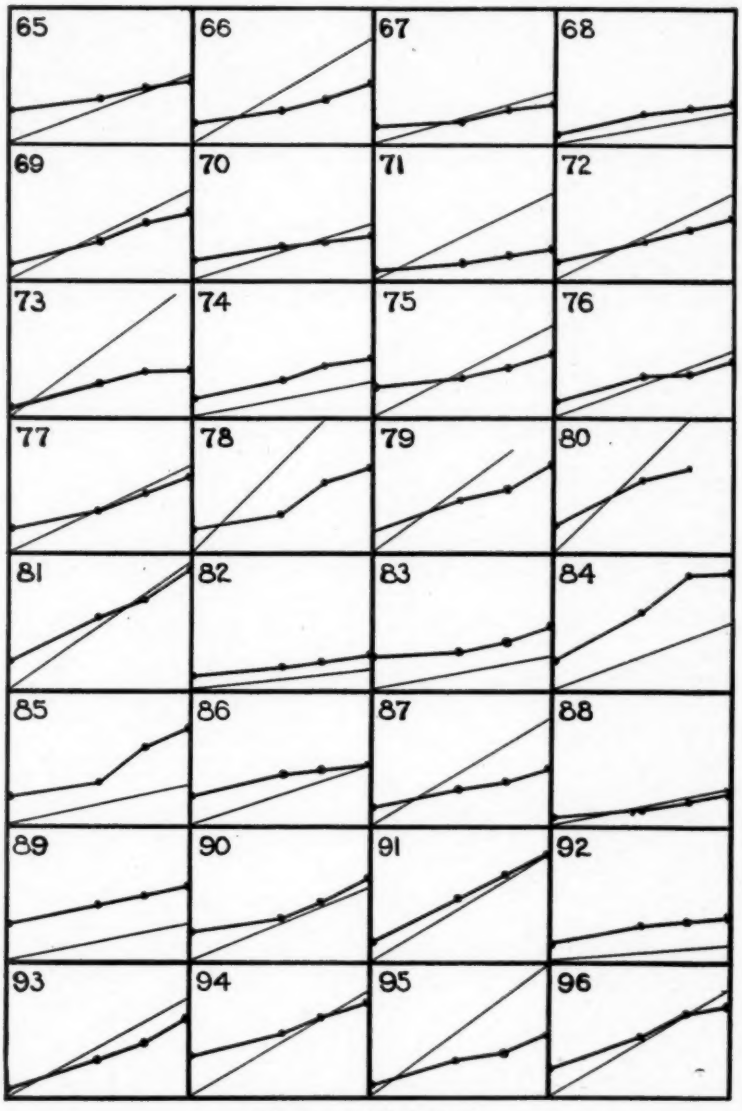

Figure 4 (Haessler).

CHALAZION—LIPOGRANULOMATOSIS

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The conception that the peculiar histology of the chalazion is explained by the reaction of the organism to necrosis of sebaceous cells, is confirmed by findings in general pathology, not mentioned hitherto in ophthalmology.

Although an extensive literature has accumulated regarding the etiology and the nature of chalazion, the process has not seemed to be satisfactorily explained until now. Various theories have been abandoned, and Schreiber concludes in the Graefe- Saemisch Handbuch that it must be a nontuberculous "foreign body granuloma." Löhlein, in Schieck and Brückner's Handbuch, speaks favorably of Schall's experiments. This author supposes that by either an inflammatory or a degenerative process the Meibomian cells become necrotic and fat is liberated. This leads secondarily to the development of granulomatous tissue, epithelioid cells, and giant cells, so characteristic of the chalazion. This condition always appeared to be specific for the Meibomian glands, though some authors, in order to confirm their opinion experimentally, injected the supposed etiological agent under the skin (B. xerosis, fatty substances) and thereupon found that tumors developed showing a similar histology.

Although Schall's experiments, especially, seemed to be very convincing, it appears that the problem of the chalazion is not yet considered to be definitely solved. Unjustly, however, for authors of recent (and older) publications of surgical and pathological data on other regions of the body have come to the same conclusion as Schall. This literature, so far as I know, was never quoted in ophthalmological publications, not even in the article by Schall. Yet it contains very strong arguments in favor of his theory.

The analogous condition in general pathology is undoubtedly the so-called fat necrosis or lipogranulomatosis, of which a good compilatory description with new cases of his own was given by V. Chlapobersky. Lipogranulomatosis (fat necrosis, fat granuloma) was formerly said to arise only in the abdominal cavity in diseases of the pancreas (Balser, 1882). When subcutaneous lipogranulomatosis was found, it became evident that some of these tumors developed around previously injected camphor oil (oleogranuloma) or other substances (vaselinoma, paraffinoma) or were induced by the necrosis of the fatty subcutaneous tissue caused by the trauma of the injection. In animals, even a subcutaneous injection of physiological salt solution may give rise to such a granuloma. It was also recognized very early that a simple mechanical trauma may cause a necrosis of the fatty tissue, leading to the development of a lipogranulomatosis (Lanz, 1898). It was found to develop after inflammation and in exanthematic typhoid fever. Recently, attention has been drawn to some facts making it very probable that a neuropathic (angiospastic) variety also exists, for development along nerves and of symmetrically situated tumors was reported.

The injury to the fatty tissue induced by one of these agents leads to focal necrosis; the fat is liberated, epithelioid, lipophagic cells, and giant cells appear, lipase develops from the damaged fat cells themselves and ferments from the white blood corpuscles, so that fatty acids and soaps are formed, inducing an inflammatory reaction and formation of granulation tissue.

In the Hollandish literature de Vries described 13 cases of his own and mentioned the related condition of adiponecrosis subcutanea neonatorum.

Cruse, in 1879, described a case of scleroderma or sclerema adultorum (which name was evidently a mistake and should be "neonatorum"). A complete survey of the literature up to 1925 is given by Carol and v. d. Zande. In a number of cases a histological de-

scription was given which showed that necrosis of subcutaneous fatty tissue was primary. The latter authors, therefore, speak of adiponecrosis subcutanea neonatorum, a disease essentially different from scleroderma or sclerema neonatorum. The most recent English literature mentioned in the article is by Westergaard. (Med. Rev., 1922, v. 39.)

Professor Zeeman drew my attention to the histology of a case of symmetric tuberculosis of the orbit, published from the Amsterdam clinic by Mulock Houwer. The histological description shows that this was a similar condition. Houwer compares the findings with those in erythema induratum of Bazin. Lewandowsky in his discussion of Bazin's disease, mentions that chronic inflammation of fatty tissue of nontuberculous origin gives a similar histological picture (atrophic proliferation of Flemming) and is not specific for tuberculosis. The latter diagnosis can be made on the positive inoculation test, the presence of bacilli, and the coincidence with other symptoms of tuberculosis. This should be borne in mind in diagnosing tuberculosis of the orbit.

The clinical picture of lipogranulomatosis shows the characteristics typical of chalazion. The tumors may increase or decrease in size, even disappear spontaneously. They tend to develop in the neighborhood of those already existing. The production of lipolytic ferments induces an involvement of the surrounding tissue, which may lead to a progression of the tumor to a size of even 40 centimeters. I have always found it difficult to understand the development of those peculiar chalazia lying in the inferior eyelid as a long-stretched smooth tumor, affecting almost the entire length of the eyelid. As the tumor is not definitely thought to be built up by confluence of neighboring chalazia, the mode of development was difficult to understand. The knowledge of the features of lipogranulomatosis, in general, makes this comprehensible; namely, that it is a result of the action of ferments. Finally, some of the lipogranulomatotic tumors become cysts filled with a serous fluid; every oculist has occasionally come upon chalazia containing a peculiar soapy-waterlike fluid. Calcification may occur.

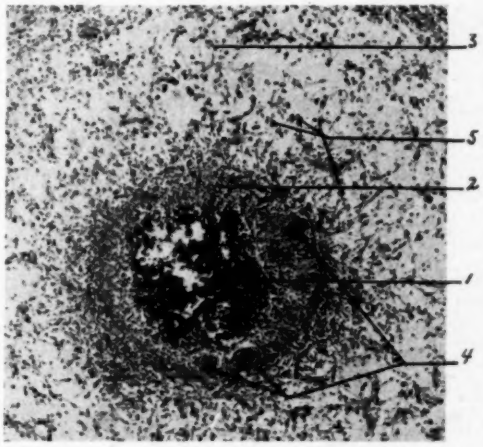

Fig. 1 (Hagedoorn). Frozen section of material obtained by scraping a chalazion; stained with sudan III.

1.Central mass of fat, stained with sudan (black on the photograph); 2. wall of epithelioid cells and exudation cells surrounding the fat; 3. loose granulation tissue; 4. giant cells; 5. mononuclear fat phagocytes.

From the foregoing it is clear that the chalazion belongs to the large group of the lipogranulomatoses. An inflammation induced by various organisms or a simple occlusion of the ducts may be primary or, perhaps, due to nervous influences and certain general infections.

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STUDIES OF RETINOPATHIES

II. Essential Hypertension

III. Diffuse Glomerular Nephritis

Correlation of retinal states with blood-pressure, renal functional status, etc.

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The first of these Studies in Retinopathies concerned the fundus manifestations in diabetes mellitus and appeared in this Journal, 1933, July, v. 16, p. 612. The present paper continues with the manifestations in essential hypertension and in diffuse glomerular nephritis. The author finds that such terms as "albuminuric retinitis" have no logical place in the diagnostic nomenclature, but that terms indicative of the vascular pathology should be substituted. The paper does not lend itself to review. From the Departments of Ophthalmology and Medicine, College of Medicine, New York University, and Divisions of Ophthalmology and (Third) Medical, Bellevue Hospital.

Since the presence of retinopathy has been used as a diagnostic and prognostic yardstick[1, 2, 3], and since numerous cases exist in which similar retinopathies are present in dissimilar disease entities, it might be well to review the types of retinopathy, and if necessary, to arrange and correlate the retinal pictures with the several types of cardiovascular-renal disease.

In reviewing the literature of fundus changes in hypertension and kidney disease, our impression is that many contributions lose their value because of the lack of definiteness in descriptions and terms. Many fundi are labeled normal, in the absence of hemorrhages, "exudates," or edema, in which vascular changes are evident. It is on such cases as these that controversial points are raised as to the nature of retinopathy in the absence of hypertension or renal disease. A description of retinopathy in acute glomerular nephritis always raises the question as to whether such cases are actually first attacks or acute exacerbations of chronic nephritis. The distinction is important, especially from a prognostic standpoint.

Furthermore, though no agreement has apparently been reached among ophthalmologists as to what constitutes vascular changes characteristic of arterio(lar)sclerosis, hypertension, and mixed pictures, the differential in the greater percentages of cases is comparatively simple. In any teaching institution where instruction in a subject is from various special angles the use of ambiguous and nondescriptive terms adds confusion to a questioning mind. This is illustrated by the use of the term "albuminuric retinitis" in which the star figure of the macular area becomes a signpost. In as much as this picture is seen in certain types of diabetes, in cases of essential hypertension with and without renal insufficiency, in chronic glomerular nephritis, in cases of increased intracranial pressure other than hypertensive encephalopathy, no one can further justify the use of the term. It is our contention, as it is with others, that the term "albuminuric retinitis" should be dropped and the subject reconsidered, making the vascular pathology dominant.

For definition, we consider hemorrhages, transudates, degenerative (cotton-wool) areas, edema of the retina and optic-nerve head as phenomena secondary to fundamental vascular changes. Accordingly, a fundus with pathologic vessels is designated as having arteriosclerotic (senile) or hypertensive vessel changes. In the latter, with the advent of hemorrhages and exudates, the suggested term "hypertensive retinopathy" is used, and if the disc is also involved, "hypertensive neuro-retinopathy[4]." The degree of involvement has also been indicated by subdivision into four classes by some authors[2], although it appears somewhat arbitrary. These terms both from a clinical and histopathologic point cov-

er the retinopathies of diabetes, essential hypertension (all phases), acute and chronic glomerular nephritis. On the other hand, they delimit all simulating retinal pictures not based on vascular changes.

The progress of medical investigation indicated by the accumulation of data newly interpreted, leads to changes in the nomenclature and classification of organic diseases. This is evident in the attitude towards diseases of the cardiovascular-renal system and the associated ocular pathology. But a short time ago, kidney lesions were classified as acute or chronic nephritis ending in large white or contracted and granular kidney. An accompanying abnormal fundus picture, if hemorrhages and exudate were present, was invariably termed "albuminuric retinitis."

The present conception of kidney disease following the accepted classification of Volhard and Fahr[5] requires the correlation and interpretation of retinopathies on the bases of the underlying organic pathology. The close relationship between states of hypertension and kidney disease accentuates the need of observing retinal changes in the light of the general physical condition and ascertaining, if possible, such occurrences for diagnostic or confirmatory purposes.

The present study covers 100 cases of essential hypertension, of which 14 are of the malignant type; 50 are cases of chronic diffuse glomerular nephritis; and 31 of acute diffuse glomerular nephritis. In the last group, a distinction is made between acute, subacute, and acute exacerbations occurring in a chronic type. Acute exacerbations are properly placed in the chronic category, and the subacute, as a transition stage, also amongst the chronic. The difficulties arising in differentiating severe benign from the malignant hypertensions has led to the inclusion of the former with the benign group.

The fundi oculorum were studied in detail in relation to the established clinico-pathologic state. All cases were followed during hospitalization and the laboratory data obtained for this period. In many cases, the opportunity was afforded to study fundi before the onset of retinopathy, through its evolution and on to death or healing.

II. Essential Hypertension

The average age for the entire group is 53.8 years; in the malignant-hypertension cases, 48.5 years. The average attributed duration of the disease in 38 women with the benign type of hypertension is 2.7 years, and in 6 with the malignant type, 2.4 years. In the malignant type, the average duration of the disease prior to hospitalization for 8 men was 1.3 years, and for 48 with the benign, 2.5 years. There is no intention to evaluate these figures as we realize that the disease-duration element is based on the personal assumption of the patient or is first known when more or less accidentally discovered and hence gives no adequate information as to actual duration. It is interesting to note, despite the element of error, that the disease duration is longer (3.2 years) in 5 percent of the group showing secondary signs of fundus disease such as hemorrhages or exudates. The shortest duration attributed was one-half year and the longest 15 years. The average blood-pressure range for this group of essential hypertension was $\frac{202.5}{125} - \frac{159.6}{96}$ during hospitalization.

Proteinuria was present at one time or another in 58 percent of the cases, ranging from a trace to boiling solid, the latter appearing in most instances in the malignant types. Of 12 cases in which urinary casts were found, 8 were of malignant hypertension.

Although 58 percent of all cases showed a urinary disturbance, and of these 12 were of the malignant type, 40 percent of the total had secondary retinal phenomena such as hemorrhages, exudates, or disc changes. Proteinuria was associated with secondary retinal phenomena 21 times and absent in 11 cases; it was recorded in 23 cases in which hemorrhages, exudates, or disc changes were not seen.

Of the 46 percent of cases with benign hypertension remaining, 3 cases of retinopathy were found in patients

suffering from cerebral accidents, 3 were associated with diabetes mellitus, 6 with severe anemia, renal or cardiac failure, and 2 with syphilis. Four cases of retinopathy were of the circinate form.

The retinal vessels were abnormal in 92 percent of the cases. The arterioles in this number were copper colored and included were vessels that were entirely coppery or irregularly so. Definite attenuation or narrowing of the arterial lumen was found in 86 percent and irregularities of the lumen caliber in 70 percent. The changes were noted for vessels of the same categorical size. Acute angulation of the arteriolar branching was found in 86 percent. We have found this to be a rather reliable sign of hypertension, confirming the statements of Friedenwald[6] in this respect. Tortuosity of the fine arteriolar twigs in the macular area especially (deSchweinitz's sign[7]) was noticed in 30 percent, of which 9 cases were in the malignant group. Some degree of venous compression at the crossings was found in 92 percent. Loss of arterial translucency was found in 98 percent.

Although retinal hemorrhages were seen in 40 percent of all cases (of which 14 were malignant), their character and position offered no new information. Exudates (all types) were found in 38 percent—yellowish, flat, and of whitish color, at times grouped into star figures or disseminated. Cotton-wool patches were usually seen associated with ordinary types of exudates. Only occasionally were retinas free from hemorrhages when exudates were present. Edema of the retina was seen in 18 percent, in 3 of which the discs were normal. Optic-disc changes ranging from hyperemia to marked edema were found in 22 percent of cases. Choked discs of high degree were not seen in the group of malignant-hypertension cases in this series. Marked neuro-retinopathy occurred 3 times, twice in cases of malignant hypertension, and once complicated by cerebral hemorrhage. Edema of disc and retina, without hemorrhages, was seen twice, both in cases of cardiac failure, one of which ended in death.

The retinopathy in the syndrome of malignant hypertension as described by Keith, Kernohan, and Wagener[1], did not appear clearly in the small group in this series of cases of essential hypertension. No doubt if our number of such cases were greater, the choked discs and "snow-banks" around the discs might have been more in evidence.

Azotemia was present infrequently in association with secondary retinal changes in cases of benign hypertension. As such it appeared coincident with cardiac failure.

Abnormal vessel changes were present in 92 percent of all cases, ranging from early to extreme degrees of sclerosis and accompanied in the majority (86 percent) by signs significant of hypertension. The group of secondary characters (hemorrhages, exudates, hyperemia or edema of disc) was present in all cases of malignant hypertension and present singly or in combinations in 31 cases of benign hypertension. In these 31 cases manifesting vessel changes and secondary occurrences, 15 were associated with lues, cerebral accidents, diabetes mellitus, severe anemia, cardiac, terminal renal failure, or gross degenerative changes. Hence, about 81.5 percent of uncomplicated cases of essential benign hypertension presented fundus changes relative to the retinal vessels alone. This percentage would probably be higher if the so-called severe benign types were shifted into the malignant class.

III. Diffuse Glomerular Nephritis

Acute. The ophthalmic literature contains scant references to fundus abnormalities complicating the first attack of glomerular nephritis. In the older literature, discussions of the ocular findings would tend to show that such pathology might occur with equal frequency in acute and chronic types of nephritis. As such, no clinical distinction between acute attacks and acute exacerbations during the course of a chronic nephritis is made. This division is necessary, as it will be shown later that the fundamental vascular changes take place during essential hypertension and the hyperpiesis of chronic glomerular nephritis, and when either of these is superimposed upon or

precedes arteriosclerosis (senile). It is of further value in that the ophthalmologist can prove of assistance in the evaluation of masked clinical diagnoses in which differentiation should be made between first attacks of glomerular nephritis and exacerbations and also in cases of cardiac decompensation with low blood pressures in which the etiology is obscure.

The following 31 cases occurred in patients with their first attacks of glomerular nephritis, the diagnosis being established by history, clinical observation, and laboratory data. Of these, five died, three in uremia, one with meningitis, and one with subacute (strept. virid.) endocarditis. Mastoiditis, endocarditis, pyelitis, sinusitis, pneumonia, and acute rheumatic fever, were found in other cases.

Twenty-seven men and four females were examined periodically during hospitalization, their average age being 36.8 years. The average attributed duration of the disease prior to hospitalization was 2.8 weeks. The average blood-pressure range was $\frac{159}{100'} - \frac{133}{76}$

Of this group, 18 could be followed up at the end of four months, four of whom had passed into a chronic phase.

Retinal vascular signs of hypertension were seen in 12.8 percent of the cases, and sclerotic changes in 16.1 percent. The average age of the former group was 43.5 years and of the latter 46.2 years. One patient developed a few retinal hemorrhages and a few small, yellowish, flat plaques of exudate 17 days after onset of disease and one day before death in uremia. Another had several retinal hemorrhages three months later, when the disease was in a chronic phase. Of the group, then, but one showed a retinopathy and then only in a terminal stage.

Retinal or papillary edema was present in 22.5 percent, ranging from blurring of disc margins to frank edema, of which three cases occurred shortly before death and four cases as a transient picture lasting from three to seven days.

Of the entire group 28.9 percent had an age average of 44.6 years and showed either hypertensive or sclerotic (senile) vascular changes; 77.5 percent of the cases were free from hemorrhages, exudates, and edema at all times. Edema of the fundal elements was the most frequent finding and hemorrhages of exudates the least, which follows the observations of others [6, 8, 9, 10, 11].

In the 12.8 percent of cases with hypertensive vessel changes, half were functional. The other 2 cases were in middle-aged patients (45-47 years), males, one of whom claimed to have had kidney disease 12 weeks, and the other 2 weeks. It is difficult to evaluate these two cases inasmuch as there are no clear statistics as to the bearing of the time element in the production of organic changes from functional changes in the retinal vessels.

Loss of arterial translucency occurred in 60 percent of all cases, and indicates the presence of almost any morbid process, as has been previously pointed out[12, 13].

Chronic. Of the fifty cases of clinically diagnosed chronic glomerular nephritis, normal blood-pressure ranges were present in two patients, one of whom had lowered dye-excreting and poor concentrating powers, and had had an attack of acute glomerular nephritis complicating pneumonia three months previously. The urine sediment count showed 116 millions R.B.C., 9 millions W.B.C., and 350 thousand casts. The other patient was classified as having an acute exacerbation of a chronic glomerular nephritis and being in a nephrotic stage. Both had normal retinal vessels except for loss of translucency. These two cases are stressed, as we feel that they are illustrative of authentic renal conditions without retinopathy, and of the relationship of vessel changes to hyperpiesis.

In this group of kidney disease, 27 were males and 33 females, their average age being 44.64 years, and the duration of disease 3.58 years. The average blood-pressure range for the entire group was $\frac{197.4}{119.4} - \frac{162.8}{100.4}$. Proteinuria was a constant finding.

The retinal vessels revealed hypertensive changes in 74 percent, sclerotic

changes without hypertensive change in 12 percent. In 91 percent of the cases of the first group, sclerotic changes were also present. In 24 percent of the entire group, choroidal sclerosis was visually evident. Phenomena secondary to the vascular picture occurred as hemorrhages in 56 percent, exudates in 52 percent, and disc changes in 42 percent. Hemorrhages were of all types. "Tarnished silver" yellowish flat plaques, star figures, and cotton-wool areas but no "snow-banks" were seen. Most exudative pictures were of mixed types, though cotton-wool areas were seen alone several times. The most frequent disc change was hyperemia, edema of low degree next, measurable swelling of the disc least. Star figures were present in 10 percent of cases.

Azotemia in association with retinopathy occurred in 72 percent of cases.* This is not an absolute figure, as in but a small percentage of cases nitrogen retention had been present at one time.

The secondary retinal phenomena occurred in 56 percent of our cases, which is higher than the usually quoted 9 percent to 33 percent of chronic nephritis with retinopathy [14a, b, c, 15], but comparable to recent statistics[16]. In none of these cases could the retinal vessels be considered normal. On the other hand, as noted above, the retinal vessels were pathologic in 86 percent of all cases. Vascular changes without secondary changes have been described frequently in chronic kidney disease[17, 18a, b].

Comments and Conclusion

Of the 181 cases described, 100 are of essential hypertension, 31 of acute glomerular nephritis, and 50 of chronic glomerular nephritis. In a previous paper[19], 100 cases of diabetes mellitus were analyzed. These cases are grouped as to clinical diagnoses and analyzed with respect to the salient features of blood pressure and kidney picture in association with fundus changes. These 281 cases are part of over 500 cases examined.

In uncomplicated essential benign hypertension, 92 percent of cases show changes in the retinal vascular tree. The earliest changes are functional in nature and then with the maintenance of hypertension become organic, becoming more complex with the addition of sclerotic signs.

It was early apparent that when hemorrhages and exudates were present, the retinal vascular tree was diseased and that the former phenomena should rightly be considered as secondary to vascular pathology. In acute glomerular nephritis (first attack) in which an essentially negative previous history in a young person was obtained, the retinal vessels were free from pathology and hemorrhages and exudates were absent. When edema of the retinal tissues had occurred, there was apparent linkage with generalized anasarca rather than with locally altered physiology. With the advent and persistence of hyperpiesis and a chronic stage ensuing, the vascular tree would show changes before the appearance of hemorrhages, and so forth. In such cases of acute glomerular nephritis in which a retinopathy exists, it is suggested that reinvestigation might reveal the condition to be one of an acute lesion with an underlying chronic vessel pathology or an acute exacerbation in a chronic stage.

In chronic glomerular nephritis, with the exception of a small percentage, the predominating common fundus finding was vascular alterations. The gross visual pictures varied greatly in degree and extent predicated on a relationship to kidney involvement and hypertension, but no clear relationship to the extent of azotemia.

Retinopathy is usual in malignant hypertension and in more than half of the cases of chronic glomerular nephritis.

A similar picture of retinopathy is common to malignant hypertension, to severe benign (transitional phase) essential hypertension, to chronic glomerular nephritis (which has also been pointed out by several observers[20, 21, 22]),

* The relationship of azotemia, its height and duration, the extent and stage of vascular changes, hypertension and retinopathy, and their prognostic significance, will be considered subsequently.

and, as has been previously noted, to diabetes mellitus associated with hypertension[19]. The relative differences in these retinopathies are apparently based on factors that play an alterative role rather than productive ones, as pointed out by Duke-Elder[22].

Inasmuch as overlapping exists in the retinal pictures termed albuminuric retinitis, arteriosclerotic retinitis, renal retinitis, etc., and diabetic retinitis, while the fundamental vessel changes are dominant, it is thought that these terms have outlived their usefulness by being neither significant nor descriptive.

With reasonable surety one can distinguish vessels with hypertensive changes from those with sclerosis alone.

"Hypertensive vessel changes" is used to describe the alterations appearing in retinal vessels in hyperpietic states. Arteriosclerotic vessels indicate that regressive changes are evident. These entities are distinct ophthalmoscopically and their appearances when together are determinable.

The terms hypertensive retinopathy and hypertensive neuro-retinopathy are worthy of freer adoption when fundi indicate the presence of vessels with changes due to hypertension, with the secondary breakdown complications of hemorrhages, exudates, edema, and degenerative areas.

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THE FUNDUS OCULI IN DIABETES MELLITUS

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In a study of the fundi of 150 diabetic patients and of an equal number who were not diabetic in the same age groups, the incidence of retinitis in the former was found to be 33 percent, in the latter only 6 percent. The authors believe that their findings justify the conclusions that diabetes *per se*, without any of its complications, may cause retinitis and that the latter offers a good prognosis provided effective diabetic therapy is instituted early, before arterio-sclerosis or nephritis has occurred. Frequent fundus examinations of diabetic patients are urged. From the Ophthalmic Department and the Metabolic Out-Patient Clinic, Michael Reese Hospital. Read before the American Academy of Ophthalmology and Otolaryngology, at Cleveland, September 14, 1934.

Although the medical literature is replete with articles on this subject, the numerous conflicting views regarding the frequency and causation of retinitis as well as the status of the retinal vessels in diabetes, justify further intensive study of this problem.

Our report differs from most previous articles on this subject in that it is not a compilation of data obtained from routine case records. All observations here recorded, both ophthalmologic and metabolic, were made by the writers for the express purpose of this study. We believe that this procedure has rendered our data more accurate and more comparable than if the more usual method had been followed.

Our method of study was as follows: Diabetic patients were picked at random from the metabolic clinic of the out-patient department of the Michael Reese Hospital. Their fundi were studied minutely, with the pupils dilated, and the findings and diagnoses recorded on special record sheets. As many of these patients as possible were reëxamined a second and sometimes a third time. When a total of 150 diabetic patients had been examined in this manner, a systematic examination and review of the diabetic status were carried out and similarly recorded. Since only 100 of these patients were sufficiently regular in their attendance to enable us to make an accurate estimate of their diabetic condition, our first two tables are based on this number of patients. However, the percentage incidence of retinitis and retinal sclerosis were approximately the same for the entire group of 150 as for the smaller group of 100. As a control measure, 150 non-diabetic patients, in approximately the same age groups as the diabetic patients, were drawn from the eye clinic and studied in a similar manner.

Criteria

Before proceeding with the presentation of our data, the following criteria, adopted by us as essential for the differentiation of the various fundus conditions must be stated.

A. Criteria for diabetic retinitis:

1. A normal or nearly normal disc.
2. Punctate hemorrhages and small bright exudates in the macular region. This condition was first described by Hirschberg[1] in 1890, and later confirmed by Leber[2], Dimmer[3], and others.
3. Mild or no sclerotic changes in the retinal vessels.
4. Sharply defined, yellowish, soapy-looking plaques about the macula and elsewhere in the fundus.

B. Criteria for arteriosclerotic retinitis.

1. Disc usually waxy in color and poorly outlined but not definitely edematous.
2. Fairly marked sclerotic changes in the retinal vessels—to be discussed later.
3. Numerous flame-shaped hemorrhages and woolly exudates scattered through the fundus, but no macular star.

C. Criteria for albuminuric retinitis:

1. Stellate or suggestion of stellate figure in macula.
2. Edematous discs and zone of edema around them.
3. Fairly marked sclerotic changes in the retinal vessels.

D. Criteria for sclerosis of retinal vessels:

This condition is very difficult to eval-

Table 1

DIABETIC GROUP. ALL CASES.

	Diagnosis	Number of Cases		Average Age	Sex		Average Duration of Disease	Severity of Diabetes			Average Blood Pressure		Cardiovascular Renal Pathology		Cooperation of Patient in Treatment		
		Total	Single fundus condition	Years	Male	Female	Years	Mild	Moderate	Severe	Systolic	Diastolic	Present	Absent	Good	Fair	Poor
I	Diabetic retinitis	27	15	55	7	20	9½	7	19	1	166	95	13	12	8	7	12
II	Nondiabetic retinitis																
	A. Arteriosclerotic	14	6	57	5	9	9	14	8	1	171	96	10	4	4	7	3
	B. Albuminuric	3	0	57	1	2	7	1	2	0	150	86	1	2	1	0	2
III	Sclerosis of retinal vessels																
	A. Moderate	29	28	54	12	18	6	12	15	3	139	83	8	21	10	7	13
	B. Severe	5	5	59	1	4	5	4	1	0	166	95	2	3	2	1	2
IV	Negative	34	34	49	14	20	7	16	14	4	138	85	8	24	12	11	11

Table 2

DIABETIC RETINITIS COMBINED WITH OTHER RETINAL PATHOLOGY

I	Arteriosclerotic	8		55	3	5	12	1	7	0	185	101	6	2	3	2	3
II	Albuminuric	3		57	1	2	13	1	2	0	150	86	1	2	1	0	2
III	Sclerosis of retinal vessels	1		49	0	1	4	0	1	0	146	104	1	0	0	0	1

Table 3

CONTROL GROUP OF NONDIABETIC PATIENTS

Diagnosis	Number of cases	Percentage	Average Age Years
Arteriosclerotic retinitis	6	4	54
Albuminuric retinitis	3	2	52
Moderate sclerosis of retinal vessels	37	25	49.5
Advanced sclerosis of retinal vessels	3	2	50.5
Negative	101	67	49

uate, as so many signs have been mentioned by various observers, especially Gunn[4], Foster Moore[5], deSchweinitz[6], Friedenwald[7], Pinas[8], and others. Some of these signs are found in normal retinae, as congenital anomalies. However, we considered the retinal vessels as moderately sclerosed only when several signs were present, especially the following:

1. Moderate arteriovenous constriction at crossing of artery and vein.
2. Deflection of vein at point of crossing.
3. Poor visibility of vessel walls.
4. Fine white lines at crossings.
5. "Copper-wire" arteries.

Tortuosity of vessels, prominent central streak, and slight narrowing of vessels were not considered pathognomonic, unless found in addition to the above signs, for they are frequently observed in subjects with hyperopia.

In advanced sclerosis, in addition to those recorded above, the following signs were found: 1. Beading, or localized constriction of the arteries. 2. "Silver-wire" arteries. 3. Very marked arteriovenous constriction at crossing and, 4. Perivasculitis, or white lines along vessel walls.

Guist's[9] sign, namely, marked tortuosity of the macular venules, was found only a few times in our series and was therefore disregarded.

Observations

Tables 1, 2, and 3 illustrate our findings. Table 1 includes all of the 100 diabetic cases in which our data are complete, both those having a single fundus condition and those presenting a combination of pathologic fundus conditions. The distribution of single and combined cases is recorded under the corresponding headings in the column entitled "Number of cases." Table 2 comprises cases of more than one pathologic condition in the fundus. It will be seen that this group together with the group of "single" cases in table 1, make up a total of 100 cases. Table 3 gives the findings in the control group of nondiabetic subjects.

It may be seen from tables 1 and 2 that the incidence of retinitis of all types was 33 percent, of central punctate retinitis alone 15 percent, and of combinations with different types 27 percent. Arteriosclerotic retinitis alone was found in 6 percent of the cases and in combination with other types of retinitis, in 14 percent. In addition, we found one case of thrombosis of the central vein in a case of arteriosclerotic retinitis; also one case of choroiditis. Extensive retinal hemorrhage was very rare and was seen only in the arteriosclerotic type of retinitis. As is evident from table 3, the total incidence of retinitis in the nondiabetic group was only 6 percent.

Comment

A number of interesting correlations may be made from our data:

1. The incidence of retinitis, and especially of the diabetic type, is much higher than is generally reported in the literature. Statistics vary from 4.8 percent by Camidge[10] to 23 percent by Shepardson and Crawford[11] and 38 percent by Gresser[12]. We believe that the greater frequency of retinitis in our series is in part due to the fact that all

our cases were minutely studied by the same observer. Wide dilation of the pupil and bright illumination is necessary, lest some of the punctate hemorrhages or small exudates in the macula be overlooked. Sometimes we missed them in one eye but having found them in the other, we repeated the examination of the first eye and detected there also a few small exudates, or punctate hemorrhages, or both. Repeated examinations are also important in this connection. About three fifths of our cases (89) were examined more than once, and 13 of these three times, during the course of our study.

2. Retinitis may occur in diabetes in the apparent absence of complications. This point has been the subject of great controversy with the preponderance of opinion of late leaning toward the negative side. While, on the one hand, Hirschberg[1], Lagrange[13], Friedenwald[14] and Gifford[15] believe that glycosuria alone is capable of producing retinitis, Foster Moore[16], Cohen[17], Wagener and Wilder[18], Dirion[19], Shepardson and Crawford[11], and Camidge[10] claim that retinitis in diabetic patients is due to vascular changes. Our findings show that out of 15 cases of retinitis punctata centralis, there were 9, or 60 percent, in which there were no cardiovascular-renal complications and 8 cases of a low blood pressure. Of the remaining 6 cases, there was one in which there was only an occasional albuminuria, in another angina pectoris, leaving only four of generalized arteriosclerosis. Definite nephritic manifestations were absent in the entire group. Furthermore, not a single case of central punctate retinitis was observed in the control group, although 27 percent of retinal sclerosis, some advanced, was recorded there. We, therefore, agree with Hirschberg that retinitis punctata centralis is to be considered as pathognomic of diabetes.

3. Our tables show that retinitis tended to occur more frequently in the severer cases of diabetes. Thus, twenty of our twenty-seven patients with retinitis were judged to have moderate or severe diabetes and only seven, mild. In the negative group, however, the ratio of mild, moderate, and severe was 16:14:4. The duration of diabetes and the age of the patient, on the other hand, had apparently very little relationship to the occurrence of retinitis, especially of the diabetic type. However, the group of cases manifesting combined fundus lesions did show a somewhat longer average duration—twelve to thirteen years; and the average age was a little less in the negative group (49) as compared with the retinitis group (55-57). The average blood pressure was higher in the retinitis $\left(\frac{150\text{-}170}{90}\right)$ than in the negative group $\left(\frac{138}{85}\right)$. This is somewhat at variance with the conclusions of Gresser[12] and Gray[20], who thought that neither the severity nor the duration of diabetes was a direct factor in the production of retinal pathology.

4. In regard to sclerosis of retinal vessels without retinitis, we found only a slightly higher incidence in the diabetic group as compared with the control group, the percentage being 34 for the former and 26 for the latter. This is quite contrary to the findings of Pinas[8] and Gresser who found vascular sclerosis in 90 to 100 percent. However, the comparatively low percentage in our series is probably due to the exacting criteria we set for ourselves, requiring, as stated above, a combination of four to five signs before we called it a case of moderate sclerosis, while the above-named authors considered them to be cases of sclerosis when only one or two signs were present.

In general, the sclerosis found in the entire group was of a very mild type. Marked arteriovenous constriction, "silver-wire" arteries, irregularity in vessel caliber, and perivasculitis were found only in rare instances, and then only in unquestionable cases of generalized arteriosclerosis.

5. The influence of adequate diabetic management upon the incidence and severity of retinitis may be judged from our figures on the degree of cooperation rendered us by the various patients. In the group of patients with retinitis the cooperation was for the most part poor and the ratio between the number of

patients showing "good," "fair," and "poor" cooperation was 8:7:12. In the negative group this ratio was 12:11:11, about evenly divided. In several cases where the cooperation was good there was an improvement, and in two cases, even a disappearance of the retinitis. On the other hand, of twenty-three patients who showed an aggravation of retinal pathology on subsequent examinations, only three had cooperated well. One of these presented a case of diabetic-arteriosclerotic retinitis with a blood pressure of 220 and blood sugar of 345 with a diabetes of twelve years' duration. The other was a patient presenting diabetic retinitis with a blood sugar of 205 and blood pressure of 160 with a diabetes of eight years' duration. In both these cases, in spite of good cooperation, the treatment, because of economic and social difficulties could hardly be called adequate. The third case is difficult to explain, since it was in a patient with a diabetes of only two years' duration and a normal blood pressure. The other twenty patients, showing aggravation of retinal pathology, had cooperated poorly, or at most to a fair degree. It is therefore, apparent that proper diabetic management will lessen the incidence of retinitis or improve it when present.

6. It is interesting to note that about two thirds of the group with central punctate retinitis had never applied to our eye clinic for treatment and the remaining one third came in on account of refractive errors or beginning cataract. Most of the patients in the former category had a vision of 20/20 or better. This would seem to indicate that retinitis punctata centralis is an early manifestation of retinal pathology in diabetes.

7. It is evident from these facts and those brought out in paragraph 5 that cases of diabetic retinitis offer a good prognosis as to vision provided the patients are properly managed and cooperate well. In advanced cases, where arteriosclerotic retinitis is added to the picture, treatment is of little avail. It behooves us, therefore, to urge the general practitioner and internist to have the eyes of the diabetic patients examined frequently. This should not only help the physician to gauge the adequacy of his treatment, but will, probably, also influence the patient to cooperate more carefully with his doctor.

Summary and Conclusions

1. A study of the fundi of 150 diabetic patients and of a control group of 150 subjects without diabetes is reported.

2. The correlation of certain retinal conditions, with the age, duration, and severity of diabetes and diabetic complications is brought out.

3. The incidence of retinitis in those affected with diabetes is greater than is commonly believed.

4. Diabetic retinitis is a definite entity and occurs in diabetes in the apparent absence of its complications.

5. The incidence of sclerosis of the retinal vessels is but little higher in persons with diabetes than in those without in the same age groups, and when present is usually less severe.

6. The prognosis of diabetic retinitis is comparatively good, provided the patient is properly managed and cooperates well.

7. Effective diabetic therapy should lessen the incidence of retinitis.

8. Frequent fundus examinations are of particular value to the diabetic patient.

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THE EXTERNAL CANTHAL LIGAMENT IN SURGERY OF THE LOWER LID

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The anatomy of the external canthus is reviewed and an operation described which allows the canthus to be displaced nasalward. This freedom permits primary closure after a considerable loss of lid tissue, such as that required in the excision of a basal-cell carcinoma. The functional result is satisfactory and the deformity minimal. From the Department of Ophthalmology, Washington University Medical School. Read before the St. Louis Ophthalmic Society, Feb. 23, 1934.

Where sometimes it becomes necessary to sacrifice a considerable portion of the lower lid, such a loss necessitates a repair, for restoring function and for cosmetic reasons. The function of the lower lid is both the protection of the eyeball and the regulation of the tears.

The most common condition requiring partial removal of the lower lid is basal-cell carcinoma of the mucocutaneous border, which usually occurs at the junction of the middle and lateral thirds of the lid. An adequate excision of such a tumor, even when treated early, will include at least a third of the lid substance, and to attempt to suture the remnants together may result in failure in healing because of the excessive tension placed on the sutures. If enough tissue is removed, the wound edges cannot be brought into apposition. Even when primary healing does take place, the lid margin is so low and tense that too much sclera is exposed.

In the present paper it is intended to discuss only the restoration of a lower lid after a considerable amount of its substance has been lost. The cure of basal-cell carcinoma is another subject, but for those who prefer surgery in the treatment of this condition, the following pages may be of some value.

Numerous surgical procedures have been described for repairing lid defects of the type in question. Many of these are complex, requiring the use of grafts, and in their complexities the chance for complications becomes great. Furthermore, the end result is not always altogether satisfactory.

It would seem that if the cut edges of the lid could be brought together in perfect apposition and made to heal by primary union, and if the lid margin could be kept at the proper level, then the end result should approach the normal. In this case, each layer would be continuous; conjunctiva would line the lid, and no substitute tissue would be required. With these ideas in mind the problem will be discussed after a review of the anatomy of the parts involved.

In the living state the external commissure can be moved freely upward, downward, and temporalward. Attempts to displace the commissure toward the nose will be unsuccessful, even after pulling strongly with forceps on the anesthetized lid. The skin and underlying soft parts of the temporal region slide easily, but the commissure remains fixed. This inability to move nasalward is accounted for by the external canthal ligament.

The external canthal ligament is a strong structure of dense connective tis-

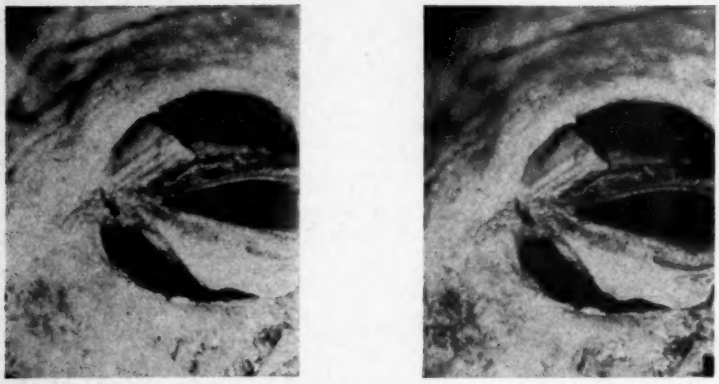

Fig. 1 (Hildreth). With the stereoscope the ligament will be seen to attach within the orbital rim. A tongue of overlying orbitopalpebral fascia has been left, but it is divided so as to show the intimate connection of the lateral horn of the levator tendon. Part of the fascia hangs down from the mid-portion of the lower lid.

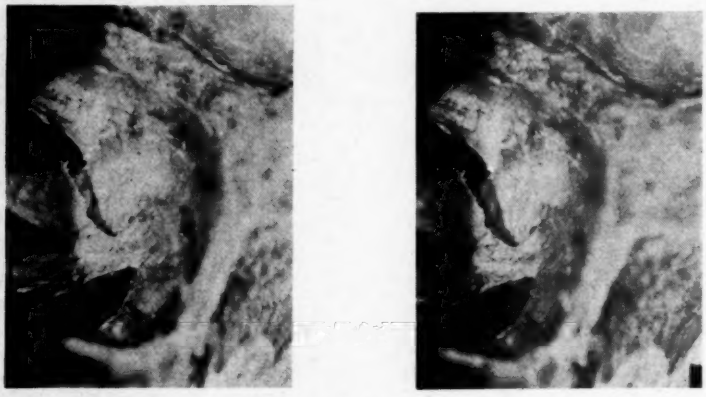

Fig. 2 (Hildreth). The ligament seen from behind, giving some idea of its size and firmness of attachment.

Fig. 3 (Hildreth). This patient had had a V-shaped excision of a basal-cell carcinoma of the right lid 16 days before the photograph was made. The length of the excised piece along the lid border was one half the total length of the lid. Note that the horizontal length of the palpebral fissure is shorter in the right eye, but the lid border is at the same level on the two sides just covering the lower limbus. The lower punctum is pulled a little to the side, but there has been no tearing.

sue which is a continuation of the two tarsal plates. The ligament attaches to the bone just within the orbital rim by fusing with the periosteum. In addition to the ligament there is a secondary support offered by the orbitopalpebral fascia, which is quite dense in this region. It continues as a membrane from the periosteum of the outer surface of the orbit, coursing toward the palpebral fissure to attach to the two tarsal plates. The lateral horn of the levator tendon becomes intimately fused with this fascia immediately in front of the canthal ligament.

These two structures, the ligament

and fascia, explain the unyielding position of the external canthus. Cutting them allows the canthus to move toward the nose, and to accomplish this surgically, the following steps are suggested: A short horizontal incision in a natural fold of the skin over the rim of the orbit gives access to the fascia and ligament. Next, by pulling the lower lid with forceps away from the globe and nasalward, the ligament can be readily felt by probing through the incision. With scissors whose tips are kept against the bony rim of the orbit, the ligament can be gradually divided, the overlying fascia, of course, being included. If tension is maintained on the lid during this step the amount of cutting necessary can be gauged by the yielding of the canthus. Greater freedom can be obtained by cutting the fascia further, along the rim of the orbit above and below. The lid defect can now be closed, but a stay-suture through the cut ends of the tarsus is recommended before skin closure.

The resulting deformity actually amounts to a decrease in the total size of the palpebral fissure. This decrease is made at the expense of the horizontal dimension and is much less noticeable than a variation in the vertical measurement. Slight amounts of lagophthalmos, exophthalmos and ptosis are very apparent, whereas the horizontal length of the fissure affects the general appearance but little. Because of the good functional and cosmetic results possible and because of the relative ease with which it is performed, this operation is offered in the hope that it may prove of value to others.

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TWO UNUSUAL CASES OF UNILATERAL EXOPHTHALMOS, ONE WITH OPTIC ATROPHY

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Two unusual cases of unilateral exophthalmos are presented, one due to a mild oxycephalic process and accompanied by optic atrophy, the other to an intraorbital dermoid cyst.

On account of the relative infrequency of cases of unilateral exophthalmos, it was thought to be of value to report the clinical studies of the two following cases. Slight protrusion of the eyeball occurs in high myopia, accompanies stimulation of Müller's muscle by drugs or systemic disease, and in paralysis of the extrinsic eye muscles. Unilateral exophthalmos, however, usually is evident in orbital cellulitis or orbital abscess from any cause, arteriovenous aneurysm, blood dyscrasias, thrombosis of the orbital veins with or without involvement of the cavernous sinus, tumors of the orbit or of its contents, rarely in Graves's disease and in orbital hemorrhage or emphysema. Elsberg, Hare, and Dykes[1] recently reported 15 cases in a series of 807 intracranial tumors in which marked unilateral exophthalmos was observed. Most of these tumors were meningeal fibroblastomata, arising in the anterior cranial fossa or in both the anterior and middle fossae, and extending into the orbit through the superior orbital fissure. Or exophthalmos was caused by means of an increase in pressure in the middle cranial fossa which was directly transmitted to the orbital contents through the superior orbital fissure. In these cases, the exophthalmic condition of one eye was for several years the only symptom, no other signs nor symptoms of brain tumor being present.

The two following cases were studied by the writer in the Ophthalmic Clinic of the Massachusetts Eye & Ear Infirmary:

Case 1. L.S., male, an eighteen-year-old American student, entered the Eye & Ear Infirmary in February, 1933, complaining of poor vision and headache. Two years previously, when being examined during the routine school vi-

sion tests, it was found that he could not read with his right eye. Four years prior to that examination, he had had no trouble in similar tests. The patient had had irregular right frontal and parietal headaches lasting three to four days at a time during the past two years; there was never any vomiting.

There was no family history of eye disease. The patient had had measles, but no other illness.

Eye examination: Right eye—vision: fingers at 5 feet, unimproved. No congestion of eyeball; normal muscular excursions. There was 5 mm. of exophthalmos as measured by the Hertel exophthalmometer. The pupil was regular, equal to the left in size, and reacted sluggishly to light; the right pupil reacted very poorly to accommodation when tested separately; but with both eyes open, both pupils reacted well and equally to accommodation. The media were clear; the optic disc was snow-white in color with slight obscuration of disc outlines. The lamina cribrosa was not particularly prominent. There was slight venous distention; no hemorrhage nor exudate.

Left eye—vision: 20/15. No congestion of eyeball; the muscular excursions were normal, as were also the pupil and media. The optic-nerve head was pale and atrophic temporally, with slight obscuration of outlines. No hemorrhages nor exudate could be seen, but there was slight venous distention. The tension was normal; there was no exophthalmos.

The right visual field was markedly constricted, showing superior temporal and superior and inferior nasal defects. The left visual field was normal. Because of the optic atrophy, the patient was admitted upon the neurological service for study.

Physical examination showed a well-developed and nourished young male adult with a tendency to an elongated anterior—posterior diameter of the skull. The general and laboratory examinations were essentially normal; with the exception of the eye findings, the cranial nerves were normal.

The x-ray report of the skull was as follows: "The convolutional markings are unusually prominent. The sella turcica is enlarged, the floor is deep and the clinoids are long. The sutures of the skull are not visible. The size and shape of the head are above normal, except for the absence of supraorbital enlargement of the frontal sinuses. There are no areas of calcification, nor is there evidence of local disease of the bone. The right optic foramen shows no variation from normal. Findings are those of advanced chronic increased intracranial pressure and premature closure of the sutures."

The patient's condition remained unchanged while upon the ward, and he was discharged to be observed at frequent intervals.

It seems probable that the explanation of this patient's condition is associated, first, with premature closure of the cranial sutures, the etiology of which is not definitely known; then, as the brain tissue continued to grow in a restricted space, a condition of continued increased intracranial pressure arose which was accompanied by a papilledema, and a shallowing of the right orbit alone, producing proptosis of the right eyeball. Following cessation of the period of growth, the intracranial pressure relationships readjusted themselves, the papilledema receded, leaving in its wake a postneuritic atrophy of both optic nerves. The unusual phase of the case is that during the period of increased intracranial pressure, force was exerted to a much greater extent upon the right orbit than upon the left, causing exophthalmos upon this side only, in addition to a more marked right optic atrophy. The whole process is one characteristic of a mild oxycephaly. This condition is not congenital, and only in a few instances hereditary. Fletcher[2] who reported 75 cases in 1910, considers the likelihood of a pituitary dystrophy. Headaches are the rule.

Case 2. R. D., a nine-year-old American student, entered the Eye Clinic in January, 1933, complaining of a dull aching nonradiating left-supraorbital pain of three months' duration. The mother stated that the left eye had been becoming increasingly prominent dur-

ing this time. There was no difficulty with vision, no diplopia at any time. The family history was irrelevant.

Past History: The patient entered the Eye Clinic in December, 1928, with the history that the lower left eyelid was becoming increasingly swollen; a moderate amount of noninflammatory swelling of the lower lid was found; otherwise, the eye examination was negative. Patient was referred to the Throat Room where an x-ray examination was reported as follows: "Both antra contain secretion. The left orbit is much larger than the right. There is no bony erosion, nor enlargement of the sphenoidal fissure. The left antrum is very small and markedly thickened." The patient was admitted to the hospital, where tonsillectomy and adenoidectomy were performed. Following his discharge, nothing was heard from him during the ensuing four years until the present admission.

Eye examination — Right: vision 20/20. Lids, conjunctiva, cornea, pupil, media, disc, and fundus were normal, as were the muscular excursions. Hertel exophthalmometer reading was 16; the field of vision, normal.

Left: vision 20/40. Lids, conjunctiva, cornea, pupil, media, disc, and fundus were normal, as were also the muscular excursions. Hertel exophthalmometer reading was 25, showing 9 mm. of exophthalmos in comparison with the right eye. The left eye was situated about 4 mm. above the right. Upon deep palpation above the inferior margin of the orbit, one could feel a freely movable soft mass which was pushing the eyeball up and out. The possibilities considered were, cyst connected with the antrum, hemangioma, lymphangioma or plexiform neuroma. Further x-ray examinations were reported as follows: "The sella turcica is normal; there is no x-ray evidence of increased intracranial pressure. The left orbit is much larger than the right, the bony outlines uniformly thinned out. Both antra contain pus. The left orbital condition is consistent with chronic increased intraorbital pressure." Physical examination with exception of the eye condition was negative. Blood Hinton and Wassermann tests were normal, also the basal metabolism.

The patient was again referred to the Throat Service where a left radical antrum operation was performed. No extension of a new growth was discovered between the floor of the orbit and antrum cavity. It was then thought advisable to puncture the mass as a diagnostic measure. Under procaine anesthesia, a 3-mm. trocar needle was inserted above the mid-portion of the inferior orbital margin. Approximately below the equator of the eyeball a resistant mass was met. It was punctured, and 8 c.c. of clear straw-colored fluid withdrawn which contained cholesterin crystals. The patient's left eye immediately receded into the orbit, and diplopia supervened, obviously because of the changed position of the eyeball. Microscopic examination of the specimen of fluid revealed the presence of fat globules, as well as cholesterin crystals, stated by Dr. F. H. Verhoeff to be typical of a dermoid cyst. Upon reaccumulation of fluid in the cystic growth, removal was advised, but operation was refused by the parents.

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References

[1] Elsberg, Hare, and Dykes. Surg., Gyn. & Obst., 1932, December.
[2] Fletcher. Quart. Jour. Med., 1910-11, v. 4, p. 385.

ARGYLL ROBERTSON SYNDROME OCCURRING WITH PITUITARY TUMORS

Report of Two Cases

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This paper concerns itself chiefly with the location of the pathological lesion which produces the Argyll Robertson pupil, provided there is a single lesion which produces this syndrome. Due to the diversity of opinion and evidence pointing to a variety of locations, it must be considered possible that the syndrome may be induced by a lesion or lesions in an area of some latitude. The cases herein reported were of patients with lesions, the nature of which was definitely known and which were definitely located, the only uncertain feature being their extent in each case. In neither case was the lesion of a diffuse character, therefore they are taken to have somewhat definite limitations as to area involved, and these limitations are the region of the pituitary body. Since they fall in the area of the hypothetical intercalary fibers, the author believes that they point definitely to the region in which these fibers have been located; that is, from the tract in the region of the anterior corpus to the Edinger-Westphal nucleus, anterior to the third-nerve nuclei in the floor of the fourth ventricle. Read before the Eye Section of the Philadelphia County Medical Society, January 9, 1934.

The exact pathology of the Argyll Robertson syndrome has not been definitely determined. During the last sixty-five years the subject has been extensively studied and a great many theories have been evolved and expounded, but most of them have been either disproved or shown to lack sufficient evidence. Anything that may contribute to the knowledge of the subject is apparently worth while.

The occurrence of this group of symptoms in connection with brain tumor has been reported a number of times, but it is a well-known fact that the great majority of the cases of Argyll Robertson pupil occur in syphilis of the central nervous system, and more especially in tabes.

Several cases have been reported as due to other nonsyphilitic causes; namely, traumatism and meningitis. Fuchs reported a case in 1919 due to wood-alcohol poisoning. The most important contributions to the subject of Argyll Robertson pupil due to nonsyphilitic causes are by Foster Moore, whose first contribution was in 1925, published in the British Medical Journal. A further contribution by the same author was published in the Transactions of the British Ophthalmological Society in 1931. He believed that the presence of syphilis was not necessary, and that the nonsyphilitic cases were apt to have some special characteristics, stating them as follows: "The light reflex is absent; *the accommodation-convergence reflex is present but is less than normal* and difficult to elicit because of the small excursion; it is more apt to be unilateral; the pupil dilates to mydriatic drugs, but sluggishly, and is usually not contracted as is generally the case in tabes. The lesions are anterior to the primary optic centers." It will be noted that these conditions harmonize exactly with case 2, herein presented. Moore does not attempt to explain just what fibers or tissues are involved to produce the Argyll Robertson pupil.

Argyll Robertson believed that this pupil was seen only in spinal diseases, and his first report was that of four cases under the title "Four Cases of Spinal Miosis—With Remarks on the Action of Light on the Pupil." He believed that the pathological lesion was in the upper portion of the cord. This theory held for many years, and many contributions were made to the subject. The characteristic pupil was described as one of miosis, not reacting to light but reacting normally to accommodation-convergence stimulus. The response to mydriatic drugs was but little, or none at all, and the pupil was often irregular in outline. The psychic responses were also absent.

It is now generally accepted that miosis is not a necessary condition and that inequality of the pupils prevails, as well as irregularity of outline. It is also

known that the failure to respond to light is of gradual development and may occur in one eye before it does in the other, that mydriasis may be present, and also that the condition may be unilateral.

It was not until many years later that writers began to promulgate other theories as to the location of the lesion which produced the pupil, and since that time a great many different hypotheses have been expounded and many of them have been discredited or disproved. It was soon known that optic atrophy was often present and might be an early symptom, even preceding the Argyll Robertson pupil. Throughout most of these discussions it has been generally believed that syphilis was a necessary factor in the causation, whether the lesion were spinal or elsewhere.

The most recent, and it seems to me the most rational theory, is that of the *intercalary fibers.* This presupposes the existence of *reflex-light*-conducting fibers which leave the tract in the region of the anterior corpus quadrigeminum and pass back to the nuclei of Edinger-Westphal, just in front of the oculomotor nuclei, or to the latter themselves. We know these fibers branch off the tract by the well-known fact that the pupil reflex to light is retained in eyes blind from lesions high up in the visual pathways of both sides. Over these fibers it is presumed that only the *reflex-light* impulses are conducted to the nuclei of the same side, and their destruction brings about loss of the light reflex. This locates the lesion farther forward in the brain than the other theories. The cases which I report are in harmony with this theory, and it will be noted that one of them is unilateral and the other bilateral. Some of the theories could not apply to the unilateral cases, a number of which have been reported.

The preponderance of evidence is to the effect that the lesion which causes the light-reflex to be arrested is located in the afferent path, and in the fibers which carry the *reflex-light* impulses. It has been shown that electric stimulation of the optic tract as far back as the region of the primary optic centers causes the pupil to contract, but that beyond this, stimulation of the tract does not cause miosis. This would indicate that the *reflex-light* impulses do not go back in the tract beyond the primary optic centers, and is in harmony with the intercalary theory. Stimulation of the accommodation-convergence fibers in the tract would not cause the pupil to contract, since this reflex is an associated one dominated by the accommodation-convergence act. In the cases of Argyll Robertson pupil reported as being due to tumors or traumatism, the lesions have always been anterior to the fourth ventricle, which also supports the intercalary hypothesis.

The miosis, it is generally believed, is due to the increased tonus of the sphincter fibers of the iris. This applies to both the light and the accommodation contractions, but some have contended that the stimulus which normally brings about increased tonus in the circular fibers also causes relaxation in the dilator fibers. Total destruction of the sympathetic ganglia in the neck and upper thorax causes the pupil to contract, but does not prevent the light reflex.

It seems to be easily proved that both the light and accommodation impulses divide at the chiasm, and that, in a normal eye, both pupils react to either stimulus in each eye. This explains the consensual loss of light-reflex in unilateral Argyll Robertson patients when the light is thrown into the good eye, and also its retention in the good eye when the light is thrown into the affected one.

Miosis prevails in syphilitic patients, in whom the vast majority of Argyll Robertson pupils are found, and this is explained by some on the assumption that the intercalary fibers are located near the meninges at the base of the brain, while the oculomotor nuclei are deep seated. A diffuse meningitis when present in the syphilitic patients is sufficient to damage the superficial intercalary fibers, but only sufficient to produce irritation of the deep-seated nuclei—thus causing the circular fibers to be stimulated and the pupil to contract. Foster Moore calls at-

tention to the fact that miosis is not so prevalent in the nonsyphilitic patients.

In presenting these two case reports, I believe that I am giving additional evidence of the existence of the intercalary fibers, and that the lesion causing the Argyll Robertson pupil involves them.

Case No. 1. Mrs. C. S. was first seen by me in October, 1933. Her past history is as follows: In 1921 she was examined by Dr. deSchweinitz, who found that she had a bilateral primary optic atrophy involving chiefly the nasal side of each disc. There was bitemporal hemianopsia, complete in the right eye but incomplete in the left. The vision was hand movements in the right eye and 6/6 in the left. Her pupils at that time showed normal reaction to accommodation in both eyes, while the *light reaction was sluggish in the right eye* and normal in the left. No further notes concerning the pupils are recorded until about six years later, when the right eye had become blind and the left, which still had fairly good vision, *showed sluggishness to light,* while both were normal to accommodation, although the right could not be tested separately on account of its blindness.

X-ray pictures were made, which showed great deepening of the pituitary fossa, with erosion of its floor and clinoid processes. She was believed to have a pituitary tumor and referred to Dr. Frazier, who operated upon her in February, 1921, by the transsphenoidal route. By this operation her symptoms were relieved, but recurred, and he again operated on her ten years later by transfrontal craniotomy, finding a large firm tumor, a part of which he removed; complete removal was not attempted. The tumor was believed to be a malignant adenoma. She made a good recovery, with greatly improved vision, but when last seen by Dr. Frazier on June 2, 1931, the right eye was blind and the vision in the left eye was 3/100. The temporal field was contracted, and there was advanced optic atrophy in both eyes.

When she was first seen by me in October, 1933, she was confined to bed in Mount Sinai Hospital. Both pupils were irregular in outline and about 3 mm. in diameter. Neither reacted to light, but both responded normally to accommodation-convergence stimulus. The right eye, being blind, was tested by the consensual test. There was advanced optic atrophy in both eyes, with considerable atrophy of the retina, as indicated by contracted arteries and coffee-ground pigment changes in the right eye. There was some vision in the left eye, but it could not be accurately determined because the patient was in bed when examined, and in a stuporous condition. No attempt was made to obtain fields.

In this patient it will be noted that the progressive development of the Argyll Robertson pupil was first noted in the right eye by Dr. deSchweinitz twelve years previous to my examination, and in the left eye six years previous. At the present time the patient has typical bilateral Argyll Robertson pupils. Syphilis was eliminated by repeated blood and spinal-fluid Wassermann tests, and by poor mercury tolerance.

Case No. 2. Mrs. H., aged 35 years, was first seen by me on February 5, 1930, at which time her corrected vision in the right eye was 20/20 and in the left 20/100. The right pupil was 3½ mm. in diameter, round, and reacted normally to light, both directly and consensually; also to accommodation convergence. The left pupil was 3½ by 4 mm. in size, with no reaction to light, either directly or consensually. It was very sluggish to accommodation convergence. These pupillary phenomena suggested a lesion behind the chiasm on the left side.

Her history showed that her menses had been very scant and irregular for seven years, during which time she had gained in weight, and menses had ceased seven months ago. She thought the loss of vision in the left eye was sudden, but was not sure that she had not simply discovered it suddenly. She had had a fall two weeks before I saw her, and had discovered the poor vision at that time.

The media were clear; the right fundus was normal except for slight haziness of the disc margins. The left disc showed atrophic changes in the papillo-

macular quadrant. Above the disc there was an old area of chorioretinitis, now in the cicatricial stage, with one large clump of pigment and several smaller ones, but no scleral exposure, the retinal coloring being about the same as elsewhere, except for the pigment and the small amount of scar tissue around it. The fields were taken and the right found to be normal, while the left showed a central scotoma extending to the blind spot; the lower temporal quadrant of the field was almost completely blind. The blind area was exactly quadrantial, the remainder of the field being normal. The patient was proved to be nonsyphilitic. There was no involvement of the extrinsic muscles, and the accommodation amplitude was, and still is, normal. The iris was of healthy appearance. There was no synechia nor atrophy. The lesion in the upper fundus did not seem to me sufficient to produce the blind quadrant, and it was my impression that there was a tumor in the pituitary region. X-ray pictures were ordered and the patient referred to Dr. Alfred Gordon for a neurological examination. Dr. Gordon's report was to the effect that there was probably a lesion on the left side between the chiasm and the posterior end of the optic tract, and since the patient thought the blindness had been of sudden origin, he suggested that it might be due to a vascular occlusion in the left tract. He had not seen the X-ray report. The pictures showed great enlargement of the pituitary fossa, with depression of the floor and erosion at places.

Dr. deSchweinitz also very kindly studied this patient with me and was inclined to view the pupillary phenomena as an iridoplegia of nuclear origin. On seeing the skull pictures he at once concurred in advising operation for pituitary tumor.

On the 23d of July, 1930, after six months' study, the patient was referred to Dr. Frazier for operation, and a right fronto-temporal craniotomy was done five days later. A soft tumor was found, which was believed to be an adenoma. It was removed, and the patient made a good recovery. The blind quadrant disappeared from the left field, but a denture occurred in the upper temporal field of the right eye, which was probably due to the traumatism and cicatrization of the operative procedures, although Dr. deSchweinitz had reported some contraction in the upper temporal field just before operation, which I was unable to confirm. This may have been due to the fact that I used a 10-mm. disc for the peripheral field, while 5-mm. discs were employed in Dr. deSchweinitz's office. A paracentral scotoma remained in the left field and is still present. This is probably due to the old chorioretinal lesion in the upper fundus.

The patient received X-ray treatment following the operation, 15 different exposures in the first series, and a few months later another series of treatments.

The corrected vision, which had been normal in the right eye and 20/100 in the left, was now 20/40 in the right eye and 20/30 in the left, there being some failure of visual acuity in the right eye following the operation, but a great improvement in the left. She now has 20/30 vision in each eye. The right field shows a wide, deep contraction in the temporal half, and the left field is nearly normal but for the paracentral scotoma which persists.

Comment

I believe case 2 to be an instance of unilateral Argyll Robertson pupil, with the pupillary lesion located in the intercalary fibers. It is true that the accommodation - convergence reaction is greatly retarded; present, but difficult to elicit. This is in harmony with Foster Moore's characterization of the Argyll Robertson pupil in nonsyphilitic patients. He states that the accommodation-convergence reaction is retarded and difficult to elicit. It is necessary to have the patient facing a good light, fix a definite small object in the distance for at least half a minute, then suddenly change fixation to a line of small figures or letters, or a pencil point held just below the line of distance fixation, so that the eyes are moved but little in the shift of fixation from distance to near. The near fixation should be at about six or eight inches.

The retardation of the accommoda-

tion-convergence reflex may be due to involvement of the pathway controlling the associated accommodation-convergence pupillary reflex. This seems quite possible in these relatively large tumors. The intercalary fibers are hypothetical, but there are good reasons, both physiological and pathological, for believing in their existence. They are believed to leave the tract in the region of the anterior corpus, and to carry the *reflex-light* impulse to the reflex nucleus of the same side.

I am aware that the exact character of the pupillary reactions in this case may be questioned. The reaction to accommodation is so small in excursion and so difficult to elicit that it may not be observed or may be considered too slight to constitute a classic Argyll Robbertson reaction to accommodation. Otherwise the reaction is typical. It must be remembered that the quantity of the accommodation reaction in the Argyll Robertson syndrome has not been definitely determined, and that it varies considerably, especially in non-syphilitic patients; also that the reaction to accommodation is always much less than to light, and the normal excursion is only one-quarter to 1 mm.

My own first notes on this patient state that the pupil is immobile to light and accommodation; but on every subsequent examination a faint reaction to accommodation could be elicited, but never to light. If this pupil is not of the Argyll Robertson type then there must be an iridoplegia, and there is much evidence against this status. An iridoplegia must be due to a lesion (1) in the sphincter fibers of the iris, (2) in the third-nerve trunk, or (3) in the third-nerve nucleus. This iris is perfectly normal in color and thickness, and the pupil dilates under homatropine to 6 mm., which eliminates a local lesion. If this lesion were in the third-nerve trunk it seems impossible that the iris fibers alone could be involved, and if the lesion were nuclear it must be very small and selective, as no other nuclei are involved. Besides, we know the nature, location, and size of the lesions in this patient, as revealed by operation, and that the region of the aqueduct of Sylvius was not involved by the tumor. Furthermore, an iridoplegia should give a dilated pupil, whereas this pupil is but little larger than normal, 3½ x 4 mm. The Von Graefe lid reflex is normal. This is the only stimulus that gives free contraction. The pupil contracts freely when firm closure of the eye by the patient is obstructed by the observer's fingers on the lids. If there were a nuclear iridoplegia, this reflex would be absent. It is established knowledge that this size and shape of pupil is common to the Argyll Robertson syndrome.

Although Argyll Robertson believed miosis to be an essential feature of the pupil, it is now generally believed that the onset is gradual and there may be mydriasis in the early stages. Spiller reports a case of unilateral Argyll Robertson pupil in which the light reaction was paradoxical; and I have seen a similar case. He believed the lesion was nuclear. His patient was syphilitic.

In both of the cases here reported we have positive knowledge of pathological lesions, their nature and location. We know that the location was such that it would not involve the nuclei. Hence, to presume nuclear involvement is to presume a second lesion of which we have no other evidence, for we must remember that there was no involvement of either the extrinsic muscles or of accommodation. A lesion at the 3d nucleus or in the Edinger-Westphal center could hardly escape involving some of these, whereas a lesion at the intercalary fibers need not include either the extrinsic muscles or the accommodation amplitude; and since the intercalary fibers are nearer to these known lesions, it is logical to presume their existence and involvement in these two cases. So far as I know, there is no reason why the lesion in all cases of Argyll Robertson pupil may not be in this location.

It is therefore suggested that the pupils be carefully studied in all cases of suspected tumor in the pituitary region, and that Argyll Robertson pupil be added to the possible diagnostic signs of such tumors.

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A PRELIMINARY REPORT UPON A NEW INSTRUMENT FOR THE DETERMINATION OF DEPTH PERCEPTION

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Fine depth perception is a function of the retinae, associated in binocular vision. Gross depth perception involves factors, such as terrestrial association, motion parallax, aerial perspective, size of the retinal image, and accommodation, which are common to monocular and binocular vision. The extraocular muscles serve to select a point of fixation.

An instrument has been developed, by means of which the factor of fine depth perception, which is peculiar to binocular vision, can be isolated for study. By the use of the instrument some new physiological principles in the function of the retina were found. Briefly stated, it was found that there exists a parallelism of linear retinal zones which has developed as a result of the limitation of the visual axes to the same plane. One retinal image of a point may be displaced laterally or medially along the same narrow retinal zone, on one retina, with an apparent displacement of the point, respectively, nearer to, or farther away from the observer.

Displacement of the retinal image perpendicularly to the parallel retinal zones results, immediately, in diplopia and loss of depth perception.

The definition of an horopter must be altered to include a section of a sphere.

The prismostereophorometer has been developed upon some newly discovered and significant principles of the physiology of the retina. The report is made upon: (1) the theory, which furnishes the basis for the construction of the instrument, (2) the specifications, with a description of the various parts of the instrument, and, (3) the functional operation in the application of the instrument.

Examination of more than four hundred aviators on the prismostereophorometer with a comparison on the Howard-Dolman apparatus shows more consistent readings on the former than on the latter. A reading of one-tenth diopter on the prismostereophorometer corresponds to ten millimeters on the Howard-Dolman apparatus. The instrument eliminates the factors in depth perception which are common to monocular vision, and it separates and measures the factor of fine depth perception, which is peculiar to binocular vision. This factor is dependent upon the specific nerve energy of the retina and is closely associated with flash images. Because of the speed of flying, the flash images and the reference to the peripheral visual fields make the instrument especially adaptable for aviation examinations.

The theory, upon which the construction of the prismostereophorometer is based, is as follows:

(1) Visual functions have developed in the human eye with the visual axes in the same plane.

(2) Images of a point in space fall upon retinal areas within lineal retinal zones that are parallel to the plane of the visual axes. This is true of the images of all points in space.

(3) Images of a nearer point fall upon retinal areas which are more widely separated on the two retinae than are the retinal areas which receive images from a more distant point.

(4) Because of this parallelism of the retinal zones, nervous connections have formed for the association of noncorresponding retinal areas lying in retinal zones that are parallel to the plane of the visual axes.

(5) There is no association of noncorresponding retinal areas lying outside of the same lineal retinal zone that is parallel to the plane of the visual axes.

(6) By specific nerve energy, a fine sense of retinal localization detects the wider separation of retinal images from nearer points, and the lesser separation of retinal images from more distant points, and affords the fine stereoptical vision, or the fine perception of depth, which is peculiar to binocular vision.

(7) If one retinal image of a point is displaced by a prism in a straight line, parallel to the plane of the visual axes, so as to separate more widely the two retinal images of the point, the point will appear to move to a position nearer to the observer. If the displacement is

such that the two retinal images are brought nearer together in a plane parallel to the plane of the visual axes, the point appears to move to a position farther away from the observer.

(8) Fine depth perception of binocular vision is a function of peripheral vision; it is best in the immediate vicinity of the macula and decreases toward the periphery.

(9) Flash images aid in making fine judgments of depth. The aviator gains information as to the lead of the ship in the horizontal and vertical planes, and as to the rotation of the ship by peripheral vision. This is a factor which shows close relationship of sense of position of retinal image and depth perception. Because of the speed necessary for flying, the aviator depends much upon flash images for information concerning his environment.

(10) With the use of the prismostereophorometer, the examiner is able to displace the image of a point in one eye, causing the point to approach, or recede; and the observer is required to adjust the retinal image of a second point in the opposite eye for the adjustment of that point to a position equidistant from the observer as the first point. This places the observer and the

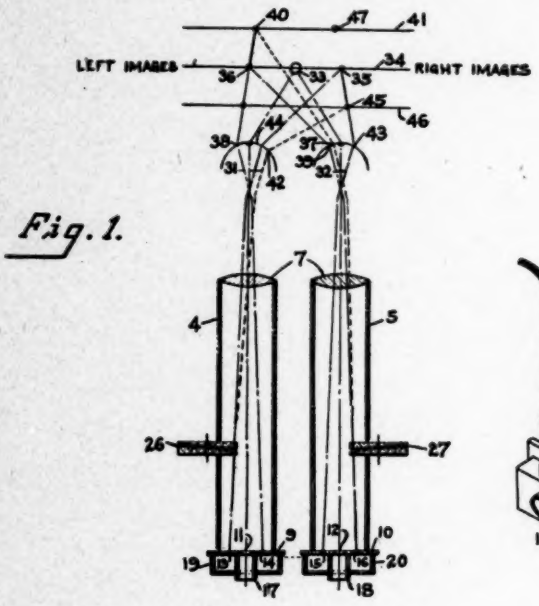

Fig. 1.

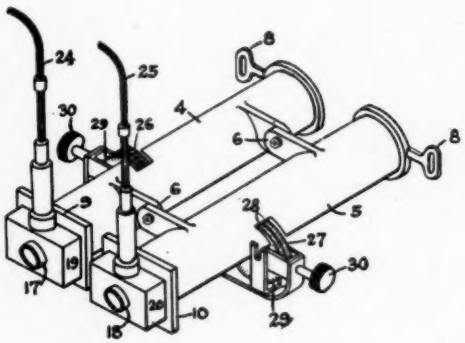

Fig. 3.

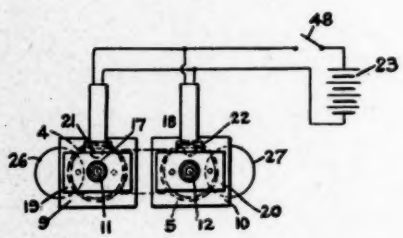

Fig. 2.

Fig. 1 (Loy). Schematic drawing of the prismostereophorometer.
Fig. 2 (Loy). Diagram of forward end of the instrument.
Fig. 3 (Loy). A view of the instrument in perspective from its forward end.

procedure objectively under the control of the examiner and lends greater significance to the test.

The barrels, 4 and 5, for the right and the left eye, respectively, are in general similar to those of a binocular field glass and are secured together by hinges, 6, to permit of adjustment for interpupillary distance. Each barrel has at its ocular end a removable positive spherical lens, 7, of six diopters, to which is attached a tab, 8, for convenience in handling.

At the other ends of the barrels are the objective plates, 9 and 10, respectively, in which are formed the central apertures, 11 and 12, each five millimeters in diameter. One centimeter from aperture 11, are one-millimeter apertures, 13 and 14, and like openings, 15 and 16, are formed on opposite sides of aperture 12 in alignment with apertures 13 and 14. Tubes 17 and 18 are placed concentrically with apertures 11 and 12, and pass through the housings 19 and 20, the plates, 9 and 10, forming one side of each. The purpose of tubes 17 and 18 is to prevent light from the lamps 21 and 22 in the housings from reaching the openings 11 and 12 while permitting illumination of the apertures 13, 14, 15, and 16. Current is supplied by battery 23, the lamps being connected in parallel through cables, 24 and 25, to obtain as nearly as possible uniform intensity in both of the lights. Barrels 4 and 5 are each sixteen centimeters in length and three and one-half centimeters in diameter. Six centimeters from the objective plates, 9 and 10, the barrels are slotted, and double rotary prisms, 26 and 27, are mounted in the slots to extend into the barrels to intercept the light rays from the openings 13 and 16. As will be seen from figure 1, each member of the double rotary prisms is wedge shaped along a diameter, and the members of each pair are mounted to rotate about a common axis, in opposite directions. As an illustration of a means for rotating the prisms there are shown gear teeth, 28 (fig. 3), on the peripheries of the prisms and a knurled head, 30, adapted to be turned to actuate a gear engaged on its opposite sides with the teeth on the prisms, whereby one prism is rotated in one direction and the other in the opposite direction. Depending upon the direction of rotation, the prisms when turned will deflect the ray of light toward or away from the rays from the other apertures and in the same plane as those other rays. Each member of each double prism is a one-half diopter prism, and is graduated adjacent to its periphery, as indicated at 29, to indicate displacements up to one diopter in steps of one-twentieth diopter.

The operation is as follows:

The right and the left retinae are represented (fig. 1) at 31 and 32, respectively, where the retinal images are formed. Ocular lenses, 7, are removed and the subject places the instrument before his eyes as if it were a field glass. He then adjusts for interpupillary distance by looking at a distant object through openings 11 and 12, and moving the barrels on the hinges, 6, until the openings appear to be superposed and form a single image at 33 on line 34. The ocular lenses are then replaced, their function being to eliminate accommodative effort and to place the eyes in a condition of rest.

If now the lights, 21 and 22 (fig. 2), are illuminated, the openings 13, 14, 15, and 16 (fig. 1) appear as points of light. It is to be noted that apertures 11 and 12 are not lighted, due to the shielding effect of tubes 17 and 18; they are visible, however, and since the eyes were fixed upon them in the adjustment for interpupillary distance they aid in keeping the eyes in the same relative positions. The openings 13 and 15 are superposed and appear as a single image at 35 on line 34. Likewise, openings 14 and 16 are superposed and form a single image at 36. This is done with the prisms 26 and 27 in the neutral or zero position and they do not deflect the light that passes through them.

This apparatus thus furnishes a unitary and convenient optical equivalent of two distant points, which we may designate as 35 and 36, and provides a means for intercepting and displacing at will the ray of light from the extreme right-hand point to the left retina, without affecting the ray from inner right-

hand point to the left retina or from the inner left-hand point to the right retina.

As above mentioned, the points 33, 35, and 36, all appear to be at the same distance from the subject. If, now, the prism 27 in barrel 5 be operated to displace the ray from opening 16 outwardly to the retinal area, 37, on retina 32, this displacement will be in the plane of the visual axes and therefore of the retinal areas 38 and 39. The significance of this fact has been discussed above. The retinal areas 37 and 38 are more widely separated than retinal areas 39 and 38. The specific nerve energy conveys to consciousness the fact of this wider separation so that the image appears to move to a position nearer to the subject, as indicated at 40 on line 41. If the ray from 13 be displaced inwardly to the retinal area 42 by manipulation of the prism 26 in barrel 4 the retinal areas 42 and 43 will be closer together than are the areas 43 and 44, and the image will appear to move to point 45 on line 46, at a greater distance from the subject.

In measuring depth perception and stimulating the faculty thereof, the examiner manipulates prism 27 in barrel 5 to displace the left image 36 on line 34 to some position such as 40 on line 41. The subject will note that the image 40 appears to be nearer than the image 35 on line 34. The subject then adjusts the prism 26 in barrel 4 until image 35 has moved to position 47 on line 41, or until it appears to be at the same distance as image 40. Any error in judging the distance will be shown by a difference in the readings on the scales of the double rotary prisms. One-tenth diopter corresponds to ten millimeters at six meters on the well-known Howard-Dolman apparatus for measuring depth perception. A difference of readings up to 0.25 diopters is considered to be within normal limits.

Because of the speed that is usual in flying the aviator depends upon intermittent, or "flash," images for information concerning his surroundings. It is preferable, therefore, while conducting the above-described test to flash the lights, 21 and 22, intermittently, by means of the switch, 48 (fig. 2), allowing them to remain lighted for an interval of about two-fifths of a second. This simulates the flash imagery of flying and imposes a more rigid and accurate test upon the subject.

By the use of this instrument, the points in the theory of depth perception as given above can be readily demonstrated. It is by the use of this instrument that a parallelism of retinal zones was first demonstrated. Furthermore, a fallacy in the presentation of Panum's areas is readily demonstrated. Formerly, it was believed that Panum's areas were circular areas about corresponding retinal areas. The so-called disparate retinal areas presented by Ames, Ogle, and Gliddon do not lie in the circular areas about corresponding retinal points. These so-called disparate areas lie only in narrow retinal zones which pass through corresponding retinal areas, and which are parallel to the plane of the visual axis.

U. S. Naval Hospital.

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EPINEPHRINE BITARTRATE: USES OTHER THAN IN THE TREATMENT OF GLAUCOMA

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The authors have found this drug effective as a mydriatic when examining the fundus in border-line cases of increased intraocular tension, also in cases of glaucoma under miotics; as a powerful mydriatic for breaking up posterior synechiae in old cases of iritis, and preparatory to operation for congenital soft cataract; also as a successful hemostatic in various operations in which a dry field is essential. From the Division of Ophthalmology, Department of Surgery, University of California Medical School.

The physiologic action of epinephrine on the normal eye was pointed out by Wessely[1] in 1900, shortly after its isolation as the active principle of the suprarenal gland. It is probable that the drug acts directly on the muscle cells of the dilator muscle of the iris or upon the sympathetic-ganglion cells within it.

At the same time it was noted that epinephrine had the effect of lowering tension in the eye, probably because of a sudden anemia produced in the vascular bed, by a squeezing out of the vessels of the choroid and ciliary body by the vasoconstrictive action of the drug. It is this latter action which was immediately recognized as of great importance in the therapy of glaucoma.

In 1924, Thiel[2] suggested the use of epinephrine bitartrate for the treatment of glaucoma.

We have been using synthetic epinephrine bitartrate (Suprarenin Bitartrate, Metz) in the Eye Clinic of the University of California Medical School for a number of years. At first we were concerned only with its effect of lowering intraocular tension in cases of glaucoma, particularly in the chronic simple type. Our experience has agreed with that of Gifford[3], Green[4], and Post[5] who have published reports upon its efficacy in this disease.

As noted above, this drug, in addition to its action on the vascular bed of the eye, is also a powerful mydriatic. In the normal eye it dilates the pupil widely and much more quickly than eucatropine or homatropine and cocaine. Its action is powerful and yet transitory, the pupil returning to normal size, in most cases, within 5 to 6 hours.

Because of this mydriatic action, we soon began using epinephrine bitartrate to dilate pupils for examination of the fundi in those people past middle age in whom the intraocular tension approached the upper limits of normal. One hesitates to dilate the pupil widely for diagnostic examination in such patients. For the same reason, the drug was of value in following up patients with chronic simple glaucoma who were under the influence of miotics. With this drug, we felt able to make more frequent examinations, both because of the shorter time it took to dilate the pupil and because our fear of inducing an attack of acute glaucoma was less. If eserine and pilocarpine were administered after the use of epinephrine bitartrate, the pupil returned to normal size usually before the patient left the office. It is true that Gifford[6] reported cases of an acute rise in tension following the use of adrenalin, but we have had no bad results to date with epinephrine bitartrate. On the contrary, the tension was usually lower after such instillation for examination than before. It also has been said that occasionally there have been severe and unpleasant general reactions after the use of the suprarenal derivatives. We believe that these reactions need not be feared in the use of the synthetic preparation, if care is taken to make up the drug in its proper dilution. We have found that 4.5 c.c. of alkaline buffer solution added to one ampule (0.091 gm.) of the powdered Suprarenin Bitartrate (Metz) was the most satisfactory. This solution, kept in a dark, glass-stoppered bottle is moderately stable, retaining its potency for about a month.

As a mydriatic, epinephrine bitartrate also suggested itself in those cases of acute iridocyclitis in which the pupil is small and the iris rigid or bound down by posterior synechiae. It was found to act well in some cases when even powdered atropine would not dilate the pu-

pil. In a few cases it separated adhesions which had not been affected by subconjunctival injections of atropine and adrenalin. Use of the drug is always followed, in these cases, by the energetic use of atropine. Several patients with neglected iridocyclitis, who had developed fairly dense posterior synechiae, were relatively little affected by from 10 to 12 days' vigorous use of atropine. Instillations of epinephrine bitartrate, however, over a period of 2 or 3 days, supplemented by atropine, broke these adhesions one by one and the pupil finally became well dilated. A small pledget or wick of cotton dipped in epinephrine bitartrate and placed in the conjunctival sac near the corneal limbus will give an eccentric dilatation of the pupil and sometimes will separate the most stubborn adhesions. Induction of a preliminary local anesthesia is advisable, particularly in cases of stubborn iritis, as the use of epinephrine bitartrate is sometimes painful.

Barkan[7], in describing a technic for the extraction of congenital, soft or membranous cataracts, advocated the use of subconjunctival injections of adrenalin 1 to 1000 immediately preceding the oblique, corneal incision by keratome, to produce maximum dilatation of the pupil, which is maintained even after the anterior chamber is opened. We have found epinephrine bitartrate, instilled twice as drops at 5-minute intervals or applied on a cotton wick just before operation, to be equally effective and even more reliable.

Because of its strong vasoconstrictive action, we have found epinephrine bitartrate of great use as a hemostatic. In this it is much more effective than adrenalin. Chalazia which have been dissected out or opened and curretted usually bleed copiously. If, however, a small, tightly wound applicator tip is moistened with epinephrine bitartrate and applied firmly to the wound in the lid after removal of the chalazion, little or no bleeding will be encountered.

One of the most important steps in the performance of cyclodialysis for glaucoma is the firm pressure of a moist piece of cotton over the scleral wound immediately upon withdrawal of the spatula. If a small applicator moistened with epinephrine bitartrate is substituted for the usual cotton or gauze pledget, it will be found to produce an immediate local blanching of the field and to prevent, quite effectively, the access of blood into the anterior chamber. This also applies to the control of conjunctival and scleral bleeding in this operation before the introduction of the spatula.

In one case, the drug was used to control the bleeding in an operation for detachment of the retina. In this, as in many other operations in which a dry field is so essential to success, the drug has proved invaluable.

Conclusions

Epinephrine bitartrate is a relatively little-used drug which deserves a prominent place in the ophthalmologic pharmacopeia.

In addition to its action of lowering tension in chronic simple glaucoma, it has been found useful as a mydriatic for:

1. Examination of the fundi in eyes with high normal tension.
2. Examination of the fundi in glaucomatous eyes which are under the influence of a miotic.
3. Powerfully dilating the pupil with the separation of posterior synechia in cases of old or neglected iritis.
4. Dilating the pupil during the operation for congenital, soft, membranous or traumatic cataract.

The marked vasoconstrictive action of this drug, which exceeds that of adrenalin, makes it an ideal hemostatic in the removal of chalazia, in cyclodialysis, and in the operation for retinal detachment, in which a dry field is essential to success.

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OCULOGLANDULAR TULAREMIA

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AND
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This is the report of a case complicated by intranasal diphtheria, with review of literature and bibliography. Read before the Pacific Coast Oto-Ophthalmological Society, July 18, 1934.

On June 1, 1934, Dr. L. C. Warenski of Nephi, Utah, referred to us an eighteen-year-old male in a delirious, stuporous and profoundly septic condition. His illness, of forty-eight hours, had begun with itching and edematous swelling of the left eyelids, followed by swelling of the left parotid region; a watery, straw-colored discharge from the left eye; chills, nausea, headache, high temperature, and delirium. The parents were alert, but could give absolutely no history of rabbit, or rodent contact, from which tularemia could have been suspected. The swelling about the eye was similar to that in an acute violent Neisserian infection, but the nonpurulent character of the discharge ruled this out. The palpebral conjunctiva was deep red, and on that of the lower lid were five discrete, rounded, yellowish-gray infiltrations averaging about three millimeters in diameter. No membrane was present. Over the center of the left cornea was a large, irregular, fluorescein-staining denudation, which healed perfectly within five days under atropine, frequent boric acid flushings, and an occasional holocaine instillation. This healing of the cornea at the height of the violent ocular tularemia is worthy of note. One case only, that of Magath and Yater, has been reported, with a perforating ulcer complicating oculoglandular tularemia.

Smears and cultures from the eye, and from the nose and throat were immediately taken, and a blood culture was made. All were on the commonly used laboratory media and all were returned as negative. There was a leucocytosis of 15,200, of which 78 percent were polymorphonuclears. Wassermann and Kahn tests were negative.

The urine showed a plus-one albumin, which cleared in about ten days. The heart was normal, but the pulse was slow, considering the height of the temperature, which is characteristic of tularemia.

Dr. Don C. Merrill, internist, was called. He immediately typed the blood and arranged with a suitable donor to respond, if called. A transfusion, however, was unnecessary. Hot magnesium sulphate packs were frequently applied to the left side of the face and neck, where the swelling and induration rapidly extended, involving the preauricular, parotid, submaxillary and anterior cervical glands. A week later, the anterior cervical glands of the right side were enlarged and indurated. We felt that this glandular enlargement resulted from tularemia rather than from

diphtheria, although the right eye at no time showed signs of involvement.

June 3, forty-eight hours after we first saw and hospitalized the patient, the blood was found negative for undulant fever, Rocky Mountain spotted fever, and for tularemia by agglutination tests, at the Utah State Board of Health Laboratory. The next day, June 4, cultures were again taken of the eye, nose, throat and blood, using a special glucose-cystine-blood agar. We did not have available any egg-yolk media. After four days, the culture from the conjunctiva and also that from the blood grew a gram-negative, pleomorphic bacillus, which was, no doubt, the bacterium tularense. Some were coccoidal and some bacillary, with a few taking bipolar-staining. Our laboratory later destroyed these positive cultures because upon investigation they found some two dozen laboratory workers had been infected with tularemia while handling this organism.

The day after the patient came to us, on June 2, he was given by the internist a morning intravenous injection consisting of Brooks hemoprotein, four minims; glucose, 40 c.c. of a 50-percent solution, and normal saline, 150 c.c. That evening at 9:30 o'clock, the intravenous injection was repeated with twice the initial dose of Brooks hemoprotein. By 10:50 p.m., the temperature had risen to 108°F, with the accompaniment of a violent chill. By morning, all symptoms were ameliorated; the patient was rational for the first time since we had seen him, and the temperature was nearly normal for several hours. During this respite, the patient himself answered all questions directly and convincingly. He had, four days before his illness, killed a cottontail rabbit with a rock at close range and had tossed it in the shade of a tree to be picked up on his way home. When the rabbit was struck, some of its blood spurted upon the patient's face. He wiped it away with his hand, probably carrying some of it into his left eye. Before going back for the carcass, he rightly reasoned that a rabbit which he could catch must have been a sick animal, and so he left it under the tree. I was so keenly interested in his recital that he added, "I can go right there and get it for you now if you want it doctor." Before evening, he had lapsed again into stupor and delirium.

Next day, June 4, our culture from the throat was negative; that from the nose was positive for diphtheria. Already (considering the newly gotten history and the ocular, general, and glandular findings), we had committed ourselves to a diagnosis of tularemia. The situation was puzzling. As many another ophthalmologist, I had read much in recent years concerning tularemia. I had known of the paper "Insect Bites" given in October, 1910, to the Utah State Society by my friend, Dr. R. A. Pearse of Brigham City; had known of the early investigations and enthusiasm of our Utah State Commissioner of Health, Dr. T. B. Beatty, in connection with Deer Fly Fever; had known of the organism's discovery in Tulare County, California, by McCoy and Chapin, in 1911 and 1912; and had heard a great deal about the thorough work of Edward Francis in Delta, Utah, in 1919, when he had demonstrated the bacterium tularense in the blood of man, named the disease "tularemia," contracted the malady, and had taken his evidence back to Washington, D.C., during the time of his own serious illness. I had not seen a case.

The patient's nose was now, on the sixth day of his illness, rapidly filling with a tough, heavy membrane. We had immediately, June 4, given him 20,000 units of diphtheria antitoxin, and repeated this dose each second day until he had received 80,000 units. The intranasal response was gradual. It was one week before he could again get air through the nose. By this time the cornea was clear; there were a few more yellowish ulcers on the left lower palpebral conjunctiva and the lids were less swollen. The bulbar conjunctiva showed no ulcers. The general condition was not improved, however, and the affected glands on the left side of the face and neck seemed worse. On June 7, the tularemia agglutination test was still negative, though the illness had lasted nine days. A test sent to

our State laboratory on June 16, however, was positive for tularemia, in dilution 1 to 1280, and another taken June 24 was positive in dilution 1 to 2560. The laboratory had thus proved our case to be one of oculoglandular tularemia complicated on the sixth day by intranasal diphtheria.

On the 26th day of his illness, the patient was returned in an ambulance to his home and to the care of Dr. Warenski. The eyes had apparently recovered, the vision being, R. 20/16, L. 20/20, and for near 0.37 M. The affected glands were still moderately swollen. It is not beyond expectation that some of them will yet suppurate. There have been no skin eruptions other than a typical serum reaction attributed to the diphtheria antitoxin. At the time of leaving the hospital, cultures were negative for diphtheria and the urine was free from albumin. The white count was 11,250, of which 65 percent were polymorphonuclear leucocytes, 20 percent small mononuclear lymphocytes, 10 percent large mononuclear lymphocytes, 2 percent eosinophiles, 2 percent monocytes and 1 percent basophiles.

The book "Tularemia" by Walter M. Simpson of Dayton, and many articles enumerated in our bibliography, give such terse, graphic descriptions of tularemia in its four recognized forms, that I shall not encumber the literature with repetition except briefly to recall a few facts which should sink deeply into our consciousness so that they shall be remembered, rather than forgotten, at the time of need.

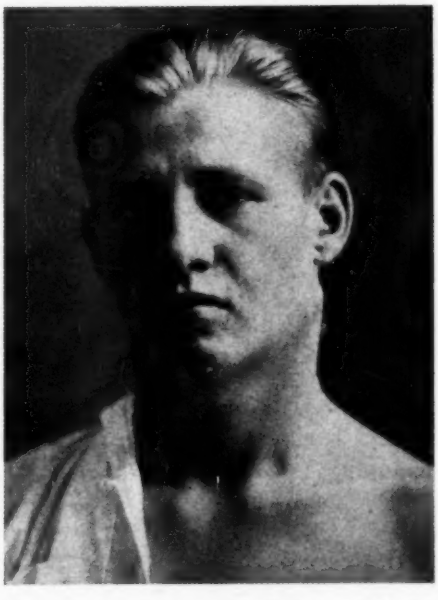

Fig. 1 (Merrill and Oaks). Patient six weeks after beginning of oculoglandular tularemia of the left side.

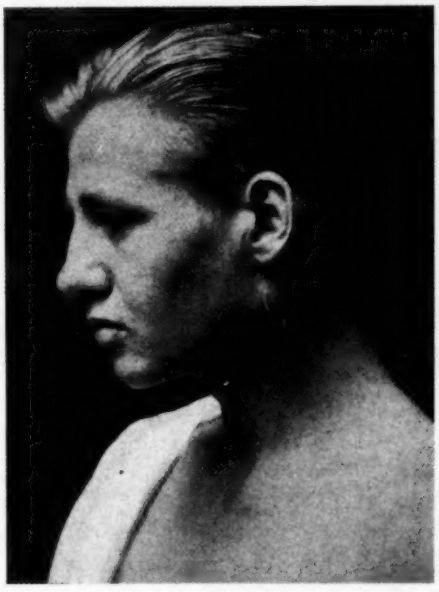

Fig. 2 (Merrill and Oaks). Profile of the same patient six weeks after illness began.

Tularemia, which was discovered and investigated in the Western United States, and at first thought to be confined to its boundaries, is really a world-wide infection. At this date, most of the states of the Union have reported it. Many cases have occurred in Russia, some in Japan, and in Norway, in Sweden, and in Canada.

Sheep are at times infected, and this foreshadows increasing spread of the disease. Rabbits continue as the most common source of infection to man. The fact that the female woodtick transmits the infection through its eggs to its larvae and the prevalence of the infection among rodents, coyotes, sage hens, and grouse, makes the stamping out of the malady well nigh impossible. Fortunately, the cow, dog, horse, hog,

Fig. 3. Patient of Dr. Malcolm C. Pfunder, forty days after onset of oculoglandular tularemia (in the Jour. Amer. Med. Assoc., 1925, v. 85, p. 1061).

and domestic chickens and turkeys seem to be immune. The domestic cat is rarely infected. As our knowledge increases, however, the great variety of insect and animal hosts widens.

The danger to laboratory workers must not be forgotten nor the fact that special culture media are necessary to a successful growth of the bacterium tularense. The organism is highly pleomorphic, assuming the coccoidal as well as the bacillary form, and the latter may present bipolar staining. Fortunately, the agglutination test is, in this disease, most characteristic and is present by the end of the second week. After this time, blood cultures are negative. The agglutination test persists for life and this circumstance has made certain the claim that the disease has been prevalent among market men and meat and fur handlers for more than thirty years; probably much longer. Cross agglutination sometimes occurs with the Bacterium abortum and with the Bacterium melitenses of undulant fever. The Bacterium tularense can and does penetrate the unbroken skin as well as the conjunctiva, and, as might be expected, readily enters any cut, sore, or abrasion.

Tularemia, however, is not transmitted from man to man. Ophthalmologists have added much to our knowledge of this world-wide American-discovered disease. Many of them believe that the condition formerly designated Parinaud's conjunctivitis or Parinaud's disease is in reality oculoglandular tularemia. Tuberculosis in some cases and fungi in others may well be the causative agent of Parinaud's conjunctivitis, but it seems certain that many hitherto appearing in this category have really been cases of true oculoglandular tularemia. Parinaud first described the disease as "a contagium derived from animals."

Ophthalomologists of Montana, especially, will remember with pride the work of Parker and Spencer of the Public Health Laboratory at Hamilton. They proved the tick to be a tularemia carrier, and demonstrated as well that sheep and coyotes are sometimes infected. Pictures of the patient of Mal-

colm C. Pfunder of Miles City, Montana, now of Minneapolis, who wrote on "Primary Tularemia of the Eye," have been included. He quotes from the "Old Timers of Montana" that "about every seven years an epidemic epizootic kills off thousands of jack rabbits." From Butte, came the report of Dr. Harold Schwartz that two Japanese section hands contracted tularemia while skinning a muskrat.

Provo, Utah.

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NOTES, CASES, INSTRUMENTS

CYST IN THE RETROTARSAL FOLD OF THE LOWER EYELID

PHILIPPE PANNETON, M.D.
MONTREAL, CANADA

Lucien M., aged twenty years, consulted me on April 14, 1932, concerning a swelling which had been present for several weeks in the lower eyelid of the right eye. The lid was puffed out

Fig. 1 (Panneton). Conjunctival cyst.

evenly, having somewhat the appearance of renal edema but without the transparency. The swelling gave the impression of originating on the inner side of the eyelid, which had a bluish tint; the corresponding area on the left eye was quite normal.

The patient was a young man in good health. One important fact was revealed in answer to questions, namely, that three months ago, he had received a violent blow on the right eyelid by a hockey puck. Several weeks afterwards he had noticed the changed appearance of his lid.

The eversion of the eyelid was a little difficult, but with a slight pull this was done quickly, exposing a gelatinous looking mass. It was a long roll extending the length of the retrotarsal fold, and adhering neither to the free edge nor to the eyeball.

A few conjunctival blood vessels ran along the surface and the conjunctiva gave a pinkish tint to the surface of the mass, which appeared to be amber-colored beneath. The content was visibly liquid, and there seemed to be no extension of the cyst beyond the fold. In fact, this seemed to be a ranula of the lower retrotarsal fold.

In order to relieve the patient who was embarrassed by this mass, and at the same time to allow exploration, a simple puncture was made. The stretched membrane resisted a little then gave way suddenly. The liquid that escaped was clear and very fluid, and somewhat sticky to the touch.

The patient returned several days after the puncture was made, and as was to be expected, the cyst had refilled.

The patient was told that an extirpation of the mass was required. After three months he decided to have this done. The operation, carried out under local anesthesia, was an attempt to separate the external conjunctiva from the wall of the cyst by spreading open

Fig. 2 (Panneton). Low-power view of cyst wall.

the points of fine scissors. As was to be expected this was only half completed when the minute pellicle broke and the cyst emptied itself. It was found impossible then to follow the line of cleavage

and we had to content ourselves with extirpation of the pouch as a whole. The operation resulted in a cure.

A year later there had been no recurrence. A tiny growth that appeared on the scar was easily reduced by electrocoagulation.

The piece of tissue removed was examined by Doctor Simard.

His report is as follows: "The oblong-shaped specimen was cut transversely, into several sections. These were all examined after being stained with hematoxylin, erythrosin, safranin, and mucicarmine.

"The surface is incompletely covered by an epithelium of varying structure (fig. 3). To the left of the section, the mucous membrane is of stratified columnar type containing several goblet cells, the contents of which stain with mucicarmine. Below this columnar epithelium, in the deep conjunctival tissue, are several islands of sebaceous glands. The presence of these sebaceous glands covered by columnar epithelium shows a remarkable similarity between this part of the specimen and a section of the eyelid. To the right, the epithelium is stratified pavement similar to that of the mucous membrane of the ocular globe.

"Between these two types of mucous membrane, in the center, is a break which penetrates deeply into the specimen of tissue. It seems to be a cyst, the walls of which have turned back on themselves after eliminating the contents through the superficial opening.

"The cyst cavity is covered with a stratified columnar epithelium enclosing several mucous cells (fig. 3). In one place the epithelium is considerably simplified becoming flattened and endotheliaform. Below this, the conjunctival tissue presents a scarlike appearance, sometimes hyaline, and is slightly infiltrated by lymphocytes and plasmocytes. This inflammatory stretch appears in the part of the cyst nearest the surface and separates the normal stratified columnar mucous membrane from the cyst itself."

In short, this seems to have been a cyst due to inclusion of tissue in the region of the lower retrotarsal fold. The case appeared to be sufficiently unusual to merit a report.

3553 Avenue du Parc.

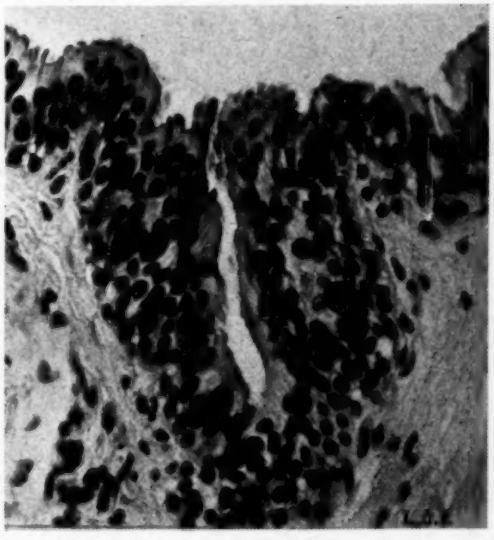

Fig. 3 (Panneton). High-power view of cyst wall.

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SIMPLIFIED OPHTHALMOSCOPE AND RETINOSCOPE AS AN ACCESSORY TO A VEST-POCKET FLASHLIGHT*

W. H. Luedde, M.D.
SAINT LOUIS

To achieve the ideal that every physician and every medical student be enabled to examine the interior of the eye, it is desirable that the cost of the required instrument be reduced to a mini-

* From Department of Ophthalmology, St. Louis University School of Medicine.

mum. To this end, a simplified ophthalmoscope and retinoscope that can be attached to an ordinary vest-pocket flashlight is presented.

Figure 1 shows this instrument slipped over the tip of such a flashlight. A slit in the barrel (a) permits the ophthalmoscope to grasp firmly the barrel of the flashlight and yet to be moved up or down upon it. The smaller cylinder of some types of vest-pocket flashlights offers no hindrance to this adjustment. A rubber band twined about it will offer sufficient resistance to hold the instrument in a desired position. A small convex lens (b) with a focal distance of approximately one inch, wedged in at the upper end of the barrel, directs the light coming from the flashlight upon a plane perforated chromium-plated metal mirror (c) placed at an angle of 45 degrees to the axis of its cylinder. The perforation in this mirror is a vertical oval with properly beveled edges, to avoid annoying marginal reflections.

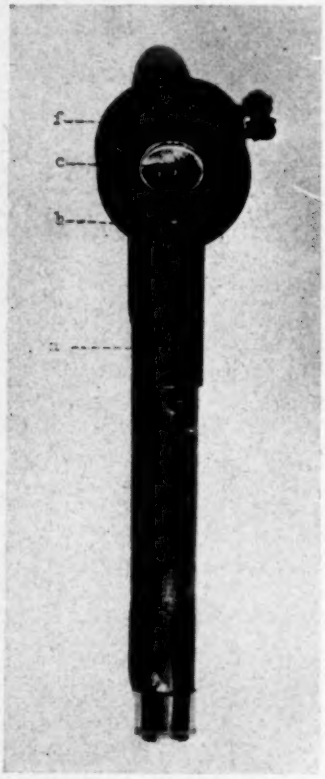

Fig. 1 (Luedde). Vest-pocket flashlight with accessory ophthalmoscope in position.

As the distance between the convex lens and the lamp in the flashlight can be altered by sliding the barrel of the simplified ophthalmoscope upon the cylinder of the flashlight, it is possible to focus the filament of the flashlight accurately upon the cornea in direct ophthalmoscopy or to produce more diffused illumination if desired. Flashlight bulbs with rounded instead of linear filaments can be selected if desired.

The plane metal mirror combined with the convex lens produces a concave mirror effect and gives the reactions of a concave mirror when used as a retinoscope. By adjusting the position of the instrument upon the flashlight, the filament in the lamp may be focused to produce a streak of light across the pupil; the meridian in which it falls may be changed by simply rotating the cylinder of the flashlight to any desired position. Special discs with slits or pinpoint openings, also cellophane or glass discs or colored filters may be inserted in front of the lamp for special purposes.

This handy flashlight accessory is equally serviceable for indirect ophthalmoscopy. For this purpose a + 12 planoconvex spherical lens is supplied regularly with the instrument.

This lens may be carried in a regular standard-sized trialcase cell attached to the posterior surface of the metal plate which on its anterior surface carries the 45-degree mirror on its abbreviated cylindrical support (f). When the + 12 lens is thus placed it permits a very satisfactory examination of the ocular media for opacities. Not only may it be used thus to discover incipient cataract but tiny particles or injuries of the cornea may be discovered that might otherwise pass unnoticed.

Any trial lens may be substituted in this cell. A special lens correcting the error of refraction of each observer may be supplied on demand; or one may simply use this ophthalmoscope while wearing the usual correcting glasses for distance for direct, or the presbyopic correction for indirect, ophthalmoscopy.

For those who prefer a +4 or +5 lens to observe the image in indirect ophthalmoscopy, it may be furnished with the instrument or taken from a trial case if available. The use of the indirect method obviates most of the difficulties incident to ametropia in the eyes being examined. Hence, all medical students should be made familiar with both direct and indirect methods.

This ophthalmoscopic accessory is in no sense a substitute for well-known models of ophthalmoscopes, which carry special mechanisms for rapid adjustment of multiple lenses, but it supplies at lowest cost the most urgent needs of general physicians and students, who, as they become familiar with the possibilities of ophthalmoscopic study can acquire the more elaborate instruments. In small bulk it supplies an inexpensive vest-pocket "handiscope" as a convenience even to eye physicians who are well supplied with regular standard ophthalmoscopes and retinoscopes.

Metropolitan Building.

A METHOD OF DEEPENING THE ANTERIOR CHAMBER IN GLAUCOMA AND CATARACT OPERATIONS

HARVEY J. HOWARD, M.D.
SAINT LOUIS

For twenty years or so I have employed a method of deepening the anterior chamber which I have never seen described in textbooks of ophthalmology nor reported in the literature. I have often been urged to describe the technic but have hesitated to do it because it was so relatively simple. It is only because I have found it effective in certain types of cases and find no evidence that it has been adopted, except here and there, that I am willing to report it now. If it has been reported already, I am not aware of it.

Indications for deepening the anterior chamber often exist in glaucoma, cataract, and adherent leucoma. In glaucoma a very shallow chamber sometimes is present and makes it dangerous or impossible to use certain cutting instruments, even a small Graefe knife. In a Lagrange or a modified Lagrange operation, which is generally my operation of choice in chronic simple glaucome, it is impossible in such cases to use an angular keratome with safety. A small Graefe knife has always been the instrument recommended in spite of the fact that the squeezing of the knife between the cornea and the iris crushes the iris badly as the small section is completed. If the anterior chamber were deep enough the angular keratome could and would be used because it makes a beautiful cut and does not crush the iris at all.

In cataract we sometimes find an anterior chamber too shallow to permit the making of a classical section and a conjunctival flap. In cases of adherent leucoma there often exists a shallow anterior chamber which may prevent the releasing of the iris adhesion, if such be required. So much for the usual indications for deepening the anterior chamber before and sometimes during an operation. There are undoubtedly other indications for doing it; e.g., increasing the tension of a soft eyeball prior to an operation.

The **technic** which I now use is, as follows:

1. Grasp the eye with a small fixation forceps, generally on the nasal side of the eyeball.

2. With a very small and sharp Graefe knife, make the usual puncture as in a cataract operation. The puncture should begin about 1.5 mm., behind the limbus and stop as soon as the point of the knife is seen in the anterior chamber. I always wear a binocular loupe so that I may make the puncture with great precision just between the cornea and iris. The knife is then withdrawn. In most cases no aqueous will be lost, or only a negligible amount.

3. Introduce into the wound made by the tiny Graefe knife a one-half inch hypodermic steel needle (No. 29) on a 1-c.c. tuberculin syringe which contains warm physiological sodium-chloride solution. When the point of the needle is visible between the iris and cornea, the fluid is slowly introduced into the anterior chamber, which very quickly may

be deepened to any depth desired. The syringe needle is then carefully withdrawn. Generally no fluid or but little escapes.

4. Proceed with the main operation.

The anterior chamber usually remains deep enough for the main operation, whatever that may be. Naturally, there should be no delay between the preliminary deepening of the anterior chamber and the main operation.

I have occasionally found it desirable not to remove the syringe from its connection with the anterior chamber especially when the fluid persisted in escaping as it does if the entrance hole is too large. I formerly used a no. 27 steel needle, but now use the smaller, no. 29, which is specially made. I have found the method useful also in maintaining the tension on the iris when an adhesion to the cornea was being cut. In this instance the syringe was held in place and manipulated during the operation by an assistant.

I once thought that I could introduce the syringe needle directly into the anterior chamber without first making a preliminary puncture. I quickly found how futile it was to try to do this. My experience with the described method has been very gratifying and I heartily recommend it.

The Park Plaza Hotel.

POSTERIOR LENTICONUS

OTIS WOLFE, M.D.
MARSHALLTOWN, IOWA

Mr. H., aged 30 years, presented himself one-and-one-half years ago for examination because an industrial examiner had rejected him on account of blindness due to cataract of the left eye. This eye had been blind from birth. The vision of the right eye was 20/20; left eye, light perception.

With dilated pupil the vision of the left eye was improved to hand movements at four feet by looking from the side. A posterior lenticonus was discovered upon examination.

With maximum dilatation under local anesthesia, a complete discission of the anterior capsule was performed. The next day, the lens substance was swelling and pushing into the anterior chamber; on the second day, this condition had materially increased, the tension was up, and the eye painful; and on the third day, the anterior chamber was filled with lens substance, the tension was 3 plus, and the eye quite painful. On the morning of the fourth day, a keratome incision was made and the anterior chamber evacuated by the Teall technic. Twenty minutes were allowed to elapse during which time the aqueous again filled the anterior chamber, whereupon the remaining cortex was sucked out. A knife needle was used to slit the posterior capsule in the vertical meridian. There was an average amount of operative hyperemia and iritis and considerable difficulty in keeping the pupil dilated but otherwise convalescence was uneventful. Ten days following the operation, the patient was dismissed from the hospital.

Two weeks after operation there was much confusion and inability to identify objects due to amblyopia. The media were entirely clear. The motion field for large objects was only slightly contracted. With +10.00 D.sph. ⊂⊃ + 2.00 D.cyl., he could count fingers at three feet. With covering of the right eye and orthoptic exercises, particularly on the Arneson apparatus, the vision slowly began to improve. With correction, there was some fusion of large objects but due to disparity of images, he could not use both eyes together.

One year after operation, the vision could be corrected to 20/200 or 10/70. He was learning to suppress the left eye. The case would be an ideal one in which to attempt correction with an iseikonic lens. At the last examination, October 15, 1934, the refraction and vision were unchanged.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

ST. LOUIS OPHTHALMIC SOCIETY

October 26, 1934

Dr. E. C. Spitze, president

The significance of visual training in relationship to orthoptic methods in amblyopia ex anopsia

Dr. M. L. Greene reported a series of cases of monocular convergent strabismus. The treatment was all nonoperative. Development of vision as the first step in the correction of the strabismus was stressed. Not only did these cases show marked improvement in vision, but without any surgical intervention or orthoptic training, there was a decided improvement in position.

Discussion. Dr. J. F. Hardesty stated that he had had the privilege of seeing most of the cases discussed by Dr. Greene and that it was remarkable to see what patience and perseverence would do in these cases of amblyopia. He also stated that the use of constant occlusion could not be stressed too strongly, and if patients were permitted to use the amblyopic eye occasionally they did not do so well.

Dr. W. H. Luedde stated that his own experience in amblyopia ex anopsia had been reported some years ago, and he likewise stressed the importance of constant occlusion.

Dr. H. R. Hildreth spoke of a case which was reported in the Proceedings section of the American Journal of Ophthalmology by Dr. Luther Peter. The case in question was that of a 44-year-old man who had suffered from paralysis of the left superior rectus and overaction of the right inferior oblique from childhood. After operation full fusion had promptly developed. Dr. Hildreth drew a comparison between this case in which probably the fusion faculty had been early developed and those cases of concomitant convergent strabismus in which the fusion center was poorly developed. In other words, there was probably an inherent difference in the child with strabismus, so often born in a family with strabismus.

Fat emboli of the retinal arteries following bone fractures

Dr. J. H. Gross reported the case of J. L., a 39-year-old man. A fracture of the left leg had been reduced and placed in a cast. On the following day the temperature rose to 38.5°C. accompanied by dyspnea, cyanosis, rapid pulse, and mental confusion. The condition improved and then recurred and on the fifth day a retinitis hemorrhagica was found. Large white flame-shaped spots accompanied the hemorrhages. The general condition improved but the vision fell to 6/60 in the right eye and 6/36 in the left eye. The fields were not limited but there was a central scotoma in the right field.

The patient recovered eventually but there were permanent changes in the maculae, a coarse "marbling," as well as narrowing of the retinal vessels and temporal pallor of the disc. Central vision was fully recovered.

Discussion. Dr. L. C. Drews inquired if fat emboli occurred after trauma not associated with bone fractures.

Dr. M. W. Jacobs asked if Dr. Gross found any cases reported in the literature as postoperative cases and how these cases differed from commotio retinae. He further asked how soon after the injuries these spots in the retina appeared.

Dr. J. H. Gross stated in closing that these serious-injury cases were not all bone cases, many were the result of pressure on the body. Bones did not have to be fractured.

The spots in the retina began to appear five or six days after the injury and sometimes even after the eighth day.

In the first group of cases it was not known if the lesion were due to fat emboli. Only after several patients had died and sections of the eyes had been

made was this revealed in the microscopic findings. The white spots in the retina were not fat.

The ocular manifestations of myasthenia gravis

Dr. G. H. Poos stated that myasthenia gravis was a disease characterized by intermittent and usually progressive symptoms of fatigue or exhaustion of the muscular system. At first the patient complained of general fatigability increasing during the day. Further progress of the disease was manifested by a marked predilection for the muscles of the face, eyes, tongue, and those of deglutition. At this time there might be transient periods of ptosis, ophthalmoplegia, or both. The ocular symptoms were, in a large percentage of cases, the presenting symptoms.

Dr. Poos said that his first patient was a 22-year-old girl who presented herself for refraction. She had first noted a peculiar weakness of the muscles about her mouth, which later spread to her shoulders, arms, and legs. About two years later she had suddenly developed ptosis and diplopia in the right eye. Her generalized weakness improved under ephedrine treatment, but the ocular symptoms remained unchanged.

When examined, the right upper lid covered one half of the cornea. There was a right external ophthalmoplegia amounting to 36 prism diopters of adduction. There was no nystagmus, the pupils were normal, the fundi were normal, and the visual fields grossly normal. Vision was 6/6 in each eye.

The second case reported by Dr. Poos was that of a woman 37 years of age, who complained of a weakness of the right side of her face and a drooping of the right eyelid. There was also difficulty in swallowing and chewing and generalized muscular fatigue which was improved by rest. Numerous operations and treatments had failed to give her relief. Examination showed a drooping of the right side of the face and a ptosis of the right lid covering 2 mm. of the cornea. After reading a short period of time the right eye showed a slight convergence. The fundi were normal and the visual fields grossly normal. No nystagmus was present; the pupils were normal. The faradic current applied to the facial muscles showed a more rapid exhaustion on the right side. Vision in the right eye was 6/7.5 and with a plus 1.00 D. cyl. axis 90° equaled 6/6. Vision in the left eye was 6/6 and with a plus 0.75 D. cyl. axis 115° was 6/6.

J. F. Hardesty,
Editor.

COLORADO OPHTHALMOLOGICAL SOCIETY

November 17, 1934

Dr. D. H. O'Rourke, presiding

Hemorrhagic cyst of the orbit

Dr. M. E. Marcove presented Mrs. A. J., aged 29 years, for whom he had removed an orbital tumor two weeks previously. A large, protruding mass had been present at the inner side of the right upper lid since the patient was about ten years old; it grew very slowly. About two years after it had been first noticed, an attempt was made to remove the growth from the conjunctival side, but this was unsuccessful because of bleeding. In 1931, an attempt to aspirate fluid from the tumor was also unsuccessful. The growth remained stationary in size until two weeks ago when it suddenly became very large and somewhat painful.

A large, soft, fluctuant mass was seen protruding from the inner canthus through the upper lid. When pushed back into the orbit the mass caused a definite proptosis of the globe. There was no pulsation felt and no bruit heard with the stethoscope. When the eye was turned to the right, the growth came forward, and when turned to the left it receded. There was some limitation of motion in adduction. Upon everting the upper lid, a large bluish-looking mass could be seen through the conjunctiva of the upper cul-de-sac. The globe was normal, and the vision 20/20. There was no connection between the

growth and the lacrimal apparatus nor between it and the sinuses. There was no bony involvement.

The cyst was carefully dissected free by blunt dissection. It extended back into the orbit to the posterior border of the globe. Several small openings were made with the forceps and through these openings oozed dark brownish-colored blood. The entire mass was removed practically intact and without damage to the muscles or globe. Microscopic study revealed a surface lining of several layers of epithelial cells beneath which was a loose connective-tissue structure showing scattered areas of hemorrhages. There was no evidence of inflammation nor of tumor formation.

Retinitis pigmentosa

Dr. C. A. Ringle presented a case of this condition in a man, aged 54 years. The patient was first seen in 1921 in consultation, at which time he complained of greatly lowered vision. With a correction of —1.00 D.sph. in each eye, vision was 20/70. He reported that as a child he could scarcely see the brightest stars. Until 1921, he could read about as well as anyone but noticed that he had trouble in seeing at night. The field was reduced to central vision and color perception was uncertain. The retina presented the characteristic bone-corpuscle pigment deposits, the lesions being distributed wide of the nerve head. The patient had had treatment in St. Louis in 1926 by Dr. North, whose examination, including a Wassermann reaction, was negative. It had been impossible to trace any history of consanguinity or hereditary disease which might be associated with this condition.

At the present time, what central vision remained was obscured by nuclear cataract. The periphery of the retina showed the characteristic appearance of retinitis pigmentosa in an advanced stage.

Discussion. Dr. Edward Jackson reported four cases of retinitis pigmentosa in which cataract extractions were done by Dr. Knapp with excellent results. There was a tendency to avoid surgery for fear of poor results, due to defective retinae. He recommended cataract extraction as a chance of decided improvement in vision, in this case.

Nystagmus and head tremor

Dr. J. M. Shields presented W. S., a seven-year-old girl, her father, C. B. S., and her grandmother. All three patients had head tremor combined with nystagmus. Both conditions were most marked in the child, less in the case of the father and much less in the grandmother. The history of such head tremor and nystagmus ran through five generations involving the young girl's father, grandmother, great grandfather, and great great grandmother. The great grandfather had had three daughters having the tremor and nystagmus, and six sons who were normal. The grandmother had two sons showing such conditions, three sons and one daughter not manifesting them. The father of this child had two other daughters showing no tremor nor nystagmus.

Keratoconus

Dr. Frank R. Spencer presented a woman, aged 38 years, whose vision had been poor for fifteen or twenty years. Dr. Spencer examined her first in 1923, when she had conical corneae, about as they were now. She was referred to Dr. F. H. Verhoeff of Boston for an optical iridectomy which he performed in the inferior nasal quadrant of each eye. He also cauterized the cornea of each eye over the superior temporal quadrant with the hope of lessening the conicity of the cornea and improving her vision.

At the present time, her vision was reduced to hand movements in the right eye and counting fingers in the left eye. With minus cylinders of from six to twelve diopters she could obtain 20/200 vision but she did not like to wear the glasses. Contact lenses would be fitted shortly. The fundi were normal.

Discussion. Dr. Edward Jackson referred to Dr. Risley's classification of myopia as anterior and posterior. Anterior myopia was principally conical cornea and was not attended by changes around the nerve head. Progressive posterior myopia was favored and caused

by extensive convergence with weakening around the optic nerve.

Dr. G. L. Strader reported a case of conical cornea with a vision of 20/200 in which an ulcer appeared at the apex of the conus. After the ulcer had healed, the vision was improved to 20/50.

Edna M. Reynolds,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

November 19, 1934

Dr. E. V. L. Brown, president

Recession operation with suture control

Dr. O. B. Nugent read a paper on this subject which will be published in this Journal.

Discussion. Dr. W. F. Moncreiff said that the operative procedure described by the essayist and designated by him as a special form of recession was not truly or essentially a recession at all, but merely a slight modification of the old-fashioned curb tenotomy, and as such, partook of the shortcomings and dangers of the ordinary tenotomy. This type of procedure, when employed for divergent squint of any considerable amount, as an operation on the external rectus, unaccompanied by any procedure on the internus, accomplished practically nothing.

The application of this method to the internus in convergent squint, as a routine method, was based on a superficial and inadequate conception of the proper objectives of squint surgery, and an inadequate standard of what constituted an ideal or even a satisfactory result. In cases in which the squint angle was rather large, 35 degrees or more, this procedure was likely to give a result in which there was a residual convergence when the fixing (or unoperated-on) eye was in the primary position, the angle of convergence increasing as the eye that was operated upon turned away from the direction of action of the crippled internus, and decreasing as the eyes were rotated in the opposite direction, reaching parallelism somewhere in this direction. In cases in which the squint angle was smaller there might be parallelism in the primary position, but the operated-on eye converged when turned in the direction away from the muscle operated on, and what was worse, diverged when turned in the opposite direction. These discrepancies resulted largely from the fact that the operation on the internus had reduced the nasal-rotation power of that eye from a hypernormal state to a more or less markedly subnormal one.

A convergent squint of five-to-ten-years' duration or more, in which a rather marked static squint angle persisted despite nonsurgical measures, exhibited also a subnormal temporal rotation of one or both eyes, and a hypernormal nasal rotation of one or both eyes. These defects, as well as the squint angle itself, were due to secondary organic (anatomic) changes in the horizontal recti and associated fasciae. It was because these changes were organic that operation was required for their correction, and since the changes were not, in most cases, limited to or largely confined to one muscle, it was not logical to expect their proper correction by an operative procedure that was limited to one muscle.

There were two important dangers connected with tenotomy of the internal rectus, especially in high degrees of convergent squint, dangers which were also inherent in the essayist's procedure. The first was that the severed end of the internus would find an attachment to the sclera at about the equator or behind it, resulting in a divergent squint which might appear rapidly or only after several years. The second danger was that of complete failure of reattachment, in which case the divergent squint was immediate and marked, and the power of nasal rotation of the affected eye not only greatly reduced but practically abolished.

Dr. Thomas D. Allen asked how one could rely upon the findings of a phorometer when the muscle was filled with novocaine. Were the findings the same as afterward, after healing had entirely taken place? Also, was any orthoptic training given before operation?

Dr. S. I. Kaufman asked how much reliance could be placed upon the Maddox rod in most cases of squint that came to operation, in which an amblyopia was found. It would appear that the Maddox test would be unreliable in such cases.

Dr. O. B. Nugent (closing) in reply to Dr. Woodruff, concerning the amount of correction that could be done in divergent strabismus, said that much more correction could be obtained by cutting the capsule upward and downward from the insertion of the muscle. Five degrees of recession should produce from 25 to 30 degrees of rotation of the globe, provided other forces were not considered. It might produce more than 25 degrees of rotation, and it might produce less, depending upon the amount of resistance that was in the capsule, and it depended also upon the amount of action that took place in the opposing muscles.

Too much recession was not the ideal method of operating; in cases in which a great deal of recession was necessary in order to produce the desired rotation, it was better to perform an advancement, a tucking, or a resection operation on the opposite muscle. Nevertheless, it was always intended to produce an overcorrection with the recession, or, if necessary, to do some overcorrection with the recession and with the advancement on the opposite side. This always gave the operator a chance to control the eye with the control suture.

As to the function of the muscle under novocaine and afterward, the muscle action was embarrassed somewhat by the use of any anesthesia injected into and around it. However, that might be easily overcome by adjustment of the control suture after the muscle had regained its stretch. The Maddox rod in cases of amblyopia was probably as accurate as any other test.

An intranasal operation for restoring the normal function of the lacrimal duct

Dr. Robert H. Good read a paper on this subject.

Discussion. Dr. S. I. Kaufman said that in most chronically infected sacs there was a changed mucosa secreting mucopurulent material, that even though one established a passage into the nose there would still be an overflow of infection into the conjunctival sac. Intraocular surgery under such conditions was less safe than after the old method of extirpation of the sac.

Dr. Sanford Gifford said that an Italian, Bracci-Torsi, had made careful bacterial studies in these cases after extirpation of the sac, and found that he did not get clean fields in any of them, although he had watched them for many months. If physiologic drainage could be established, it seemed we should have a clean field. He had never seen Dr. Good's operation, but compared with an operation in which the endeavor was to suture the nose to the sac, it would be appreciated that this procedure was much simpler. It depended much less on anatomic relations for success. In the Dupuy-Dutemps operation there must not be an ethmoidal cell in the way, otherwise a suture between the walls could not be made.

Dr. R. H. Good (closing) said that Dr. Yankauer deserved the credit for chiseling off the osteum, but did not use a probe in the canaliculus. He performed a submucous resection of the inferior turbinate, made a flap, included the turbinate, and turned the flap back, dissecting the membrane from underneath, then took out the turbinate bone and left the membrane. He did all this work without a guide, but with the probe in the lacrimal apparatus one had a guide all the time. The operation shown was not difficult to perform.

With Dr. Kaufman, Dr. Good could not agree. In his experience extirpations were anything but clean. It was practically impossible to extirpate the entire lacrimal sac without chiseling off part of the orbit. In studying the cadaver specimen it was found that the sac went all the way down to the inferior turbinate. After an extirpation it would be found that there was still pus in the sac, and that the sac had not been entirely removed. Further, extirpation was difficult.

He said that Dr. Goldenburg asked an expected question about the reattachment of the inferior turbinate. In the first twenty-two operations per-

formed, the anterior one third of the inferior turbinate was amputated, but in the last six cases only the attachment of the turbinates was separated, and they reëstablished themselves. These cases were clean after operation, and the function was the same as in a normal eye.

A new treatment of trachoma (preliminary report)

Dr. Elias Selinger read a paper on this subject which will be published in this Journal.

Discussion. Dr. W. F. Moncreiff said that the essayist had made a very satisfactory analysis of the problem of the drug therapy of trachoma, and his choice of quinine was an excellent one, inasmuch as this alkaloid had to a high degree the requisite properties for combating the pathologic changes in the conjunctiva, and with a minimum of undesirable side effects.

From personal observation of these trachoma patients on whom quinine had been used as the sole form of therapy, he could testify to the definite and at times strikingly rapid regression of the hypertrophic changes in the trachomatous conjunctiva. No final conclusions could be offered on the basis of such a short period of observation and such a limited number of patients, yet the results in this preliminary work had been so satisfactory that it was to be hoped that the method would be undertaken by many workers both here and abroad, particularly by those who had to deal with considerable numbers of trachoma patients. By this means, to a greater extent than any other, we might expect to reach eventually a correct estimate of the value of this form of therapy. The possibility of the beneficial action of quinine in such other diseases of the conjunctiva and cornea as were characterized by lymphocytic infiltration was an interesting one.

Dr. Elias Selinger (closing) in answer to Dr. Gifford, said that the amount of scar tissue had been surprisingly little. A few patients who had had trachoma for a long time showed a fairly large amount of scar tissue, the result of the long-standing trachomatous process. The treatment itself did not cause any scar-tissue formation; in fact, it seemed to reduce the amount of scarring. In answer to Dr. Allen, so far as he could judge, pannus seemed to be favorably influenced by the quinine. Replying to Dr. Muskat, he had had no personal experience with nupercaine in treatment of trachoma, and had seen no reference in the literature to its use in this disease. It would seem, though, that the deep anesthesia it produced would be an unfavorable factor.

Robert von der Heydt

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

November 19, 1934

Dr. W. W. Wilkerson, Jr., chairman

Persistent hyaloid artery

Dr. Hale E. Cullom presented Miss L. V., aged 20 years, who had consulted him on October 30, 1934, complaining of asthenopia.

Examination revealed lids and conjunctiva normal. The pupils were equal and active. In the right fundus there was a vessel filled with blood extending from the disc almost to the back of the lens. The vessel was in the position of the hyaloid canal, and appeared to come from the central artery of the retina. After extending into the vitreous for a distance of about 15 mm. it turned on itself and returned to the disc. This vessel was filled with blood which appeared to be in circulation. No visual disturbance was caused by this anomaly. The vision was normal in each eye.

Hale E. Cullom,
Secretary.

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* Deceased.

MIKULICZ'S DISEASE AND UVEO-PAROTITIS

Mikulicz in 1888 described a noninflammatory, chronic disease, showing a bilateral enlargement of the lacrimal and salivary glands, especially the parotid, and sometimes the submaxillary. He thought this a distinct disease entity and recognized with it no general symptoms. However, Krailscheimer reported a case in a young man that began with dryness of the eyes, nose, and throat, followed by uveitis in both eyes, with nodules in one iris, enlargement of the lacrimal and all the salivary glands, and also the lymph glands of the head, neck, axilla, and groin. There was a positive tuberculin reaction, and the excised lymph glands contained tubercle bacilli. Other observers have found positive Wassermann reactions, but no improvement from antisyphilitic treatment.

In other cases there has been a great hypertrophy of lymphoid tissue, and in some cases all the features of lymphoid anemias. Among later writers there has been a disposition to recognize a "Mikulicz disease," conforming to the original description, and also a "Mikulicz syndrome," presenting a similar group of symptoms encountered in connection with tuberculosis and the lymphatic anemias. Some have doubted the existence of a separate disease, and have thought that in all cases the syndrome was incidental to one of a number of diseases, the symptoms of which had been overlooked. A third possible explanation would be a new disease, as yet not recognized, but in some cases resembling tuberculosis or the lymphatic anemias. A suggestive fact is the absence of caseation and, usually, of tubercle bacilli. The histologic changes found remind us that giant cells may indicate either foreign-body irritation, sympathetic ophthalmitis, or tuberculosis.

In 1909, Heerfordt published a case of what he called uveo-parotid fever, marked by inflammation of the uveal

tract, great swelling of the parotid glands, and fever. Some cases of this kind have been ascribed to mumps; some have been associated with tuberculosis, but showed no caseation of the lesions, and had a strong tendency to recovery. Anemias have all been recognized in these cases. About one half of the cases have been attended with facial paralysis. The Lancet for October 6, 1934, contains three papers on the subject, one headed "Uveo-parotid tuberculosis," one "Uveo-parotitis polyneuritica," and one "Uveo-parotitis."

The first of these was based upon two cases in which typical tuberculous lesions were present, but no tubercle bacilli were found and both cases went on to partial recovery. In one case there was partial paralysis, both motor and sensory, of upper and lower extremeties, and bilateral neuritic deafness. Tuberculids developed over both shins, sections of which showed the typical tubercle follicles, with giant cells, but without caseation or necrosis. An excised nodule did not cause tuberculosis in two guinea pigs. The nervous manifestations disappeared. In 18 months the patient's weight increased by 17 pounds. With posterior synechiae, vision was: right 6/18, left 6/12. Saliva was secreted in subnormal quantity. In the second case, biopsy on both parotids showed histologically typical tuberculosis, but tubercle bacilli could not be found in the sections "in spite of the most careful searching." After three years the patient "reports that she is now normal in every way."

The paper on "Uveo-parotitis polyneuritica" is based on a case in which there were uveitis, facial paralysis, and loss of knee jerks before the swelling of the parotids began; later, when the neuritic symptoms had disappeared, there was "typical tuberculous iridocyclitis." When first seen the patient had a remittent pyrexia, for which all attempts to discover a cause had failed. The third paper by Tait, the only one written by an ophthalmologist, was based on the case of a man with a history of misty vision for three weeks, who came with both parotids enlarged. The pupils were semidilated, and there was subnormal accommodation of the left eye. There was punctate keratitis, worse in the left eye, which showed ciliary injection. He had hoarseness, weakness of the palatal muscles, pain and weakness of the right leg, absence of right knee and ankle jerks, and right facial palsy. These nervous symptoms disappeared in a few days, except the facial palsy, which markedly improved. The Wassermann reaction and blood examinations were negative.

Tait reviews the evidence regarding tuberculosis. He points out that while some of the reported cases showed evidence of tuberculosis, the iris sections have never shown tubercle bacilli, and that portions of exudate, injected into the anterior chamber of the rabbit and the peritoneum of the guinea pig, have failed to produce tuberculosis. In view of the conflicting facts he feels that the name of uveo-parotid tuberculosis for this disease is not justified. In cases clearly associated with syphilis, antisyphilitic treatment has failed to give relief. A fourth paper, published in the same issue of the Lancet, is by M. E. Rees, Honorary Physician to Cardiff and Swansea Hospitals. He reports a case of "Mikulicz's Syndrome in association with tuberculosis." In this case there were also uveal lesions, which were pronounced those of healed tuberculosis. It is suggested that it may be classified as a case of uveo-parotid tuberculosis.

In this connection, the original case of parotid swelling with uveitis reported by Cutler, five years before Heerfordt published his case, should be considered. A colored woman, aged 20 years, had noticed bilateral parotid painless swellings for a year, and more recently a swelling of the lacrimal glands. The submaxillary glands also were enlarged. She had also noticed diminished vision and irritability of one eye for about four months. The iris had nodules near the edge of the anterior chamber, and in the other eye were a few corneal precipitates; later small nodules also appeared in the angle of the anterior chamber. A year later the parotid enlargement had markedly decreased, and no enlargement of the lac-

rimal glands could be made out. Cutler noted resemblance to the Mikulicz syndrome, but the uveal involvement was something new.

At the meeting on November 9, 1934, of the Section of Ophthalmology of the Royal Society of Medicine, T. H. Whittington reported a case of "Symmetrical enlargement of the lacrimal glands," noticed for four years, and iritis of the right eye which brought the patient to seek relief. The right gland was removed easily by blunt dissection, and was found very hard, like scirrhus cancer of the breast. Sections showed mainly fibrous tissue and some lymphomatous areas. The pathologist did not find any trace of malignancy. Whittington asks: "Is there a uveo-dacryo-adenitis syndrome?"

It would appear that the syndromes described by Mikulicz and Heerfordt have important points in common. They are both likely to attract the attention of the ophthalmologist. Neither of them has been placed on an etiologic basis. They should be thought of and studied together. The nerve impulses that control the secretion of the lacrimal glands are not well understood. But it has been pointed out (Posey and Spiller "The eye and nervous system," p. 344) that the relation of the seventh nerve to the lacrimal gland, through its great petrosal branch, resembles its relation to salivary secretion through the chorda tympani. This analogy in nerve supply may have some important influence in pathology.

Edward Jackson.

GERM PLASM AND CURES FOR CATARACT

Several thousand years ago the Hebrew poet estimated the span of man's life at seventy years. At eight or ten years a dog is an old dog; a cow is senile at fifteen to twenty years; and a horse at a somewhat more advanced age. Moths are creatures of a day.

The average duration of life of mankind is being steadily increased by success in avoidance of the acute disorders which carry off infants or adults before their time. But it will probably remain always even less possible for man to prolong his natural longevity than it is for him to add, "by one cubit," to his stature.

Natural longevity, in moth, dog, horse, or man, is controlled by some peculiar quality of what modern biologists have called the idioplasm or germ plasm, that portion of the germ-cell protoplasm which is regarded as determining the character and heredity of the species. As great as the mystery of life itself is the mystery surrounding the fact that a single cell of microscopic size can not only virtually contain the future individual with his physical and mental characteristics, but can control the duration of his life and the onset of senility, even as regards the separate organs of the body.

In some families we see inherited a tendency to long life, while in others there is a repeated record of early natural death. Premature senility of the separate organ or group of organs in an otherwise healthy and vigorous individual is well known to us in the familial records of early cardiovascular disease, as well as in familial baldness, grayness, or blindness from cataract.

It is strange that as regards man some sociologists still feel justified in denying the predominant significance of heredity, although this factor is universally recognized in the production of plants and in the breeding of the lower animals. Many a foster parent has experienced tragedy from revelation of hereditary mental defects or perversions in an adopted child, after years of excellent education and home surroundings.

Vogt ("Textbook and atlas of slit-lamp microscopy," second edition; also in the French translation entitled "The senescence of the eye," Annales d'Oculistique, 1935, volume 172, page 106) emphasizes the hereditary factor in most forms of cataract. With his collaborators Barth and Horlacher, he was able by systematic examination through the dilated pupil to demonstrate senile opacities of the lens in ninety percent of several hundred patients over the age of sixty years.

The medieval search for the elixir of life was based on ignorance or misunderstanding, but not less so (Vogt argues) than the efforts of Steinach and others to base senile changes upon extraneous influences such as defects in the organs of internal secretion.

If the presence of lens opacities is normal as a manifestation of local senility, and if their premature or more complete development in some individuals is determined by the idioplasm of the primitive germ-cell at the time of conception, what reasonable expectation can there be that these lens opacities will be arrested or dissolved by any type of local or general therapy?

Siegrist (monograph on senile cataract) attributes lens opacities and other signs of senility to insufficiency of the endocrine glands, and so he prepared from these glands a substance which he calls "euphakine," and which in the course of three years he administered to thirty-two patients all of whom had coronary cataract.

Vogt objects that Siegrist's observations and arguments were applied to a form of cataract which has a tendency to remain stationary for years, rather than to cupuliform subcapsular cataract, which is frequently encountered, progresses rapidly, and would certainly lend itself to demonstration of any benefits arising from medication.

Why, asks Vogt, in view of Siegrist's theory that senility is in large part due to insufficiency of the endocrine glands, would it not be equally logical to employ "euphakine" or a similar polyglandular preparation as a "eudermine" to avoid wrinkling of the skin, as a "eutrixine" to protect against graying or loss of the hair, as a "euencephaline" to avoid senility of the brain, or, in short, to protect against every senile change?

The statistics advanced in favor of various forms of nonoperative treatment for cataract are subject to various sources of error, and more particularly as regards determination of the vision. The visual acuity of eyes containing opacities of the transparent media depends upon a number of variable factors. Morad (Zeitschrift für Augenheilkunde, 1926, volume 59, quoted by Vogt) showed the great importance of light adaptation in these cases. Other factors are size of pupil, the relative position of the opacities and of the transparent parts of the lens, the highly variable refraction of the transparent portions of the lens, and the mental condition of the patient.

Vogt's careful drawings and the experience of other writers show that senile cataract may remain stationary for many years. Vogt therefore urges the ophthalmic physician not to be deceived by apparent successes in the treatment of this condition, and not to build scientific theories upon such spurious successes. "There is no other branch of medicine in which charlatanism is so widespread and in which it is so easy to suggest to the patient success by any form of treatment whatever. For it requires decades for cataract to mature, so that in the majority of cases maturity never occurs."

W. H. Crisp.

THE SPECTRUM

The vastness of the full electromagnetic spectrum may be realized from the calculation that if the visible spectrum were spread out so that red and blue were one foot apart, the full spectrum would be over a million miles long. Ophthalmology utilizes both ends of the spectrum, x-rays and diathermy, as well as several intermediate portions, of which visible light, of course, is the most important. This extraordinarily immense spectrum is throughout alike in its physical characteristics, being composed of electromagnetic ether vibrations which differ only in wave length. But in their effects, certain waves are widely different and unrelated to each other.

In radium emanations, the gamma rays range in wave length less than .01 mu (1 mu = .000,001 mm.). X-rays are slightly longer, their band extending up to 50 mu. The "hard" rays, which are those of short wave length and are the most penetrating, are used in "deep therapy." In this treatment the "soft" rays are filtered out by aluminum

sheets, which protect the skin during exposure.

To pass over a poorly known spectral region (in which lie the cosmic rays), there is next the ultraviolet band. These rays, discovered about one hundred years ago, for a quarter of a century have been known to be useful therapeutically. Besides the actinic effect of ultraviolet light, these rays also produce the phenomenon known as fluorescence. Applied surgically, this action has been an aid to the removal of dislocated lenses.

These two, x-ray and ultraviolet, spectral bands affect matter by their influence on atomic structure, and the action is known as photochemical response. There is evidence to show that electrons may be displaced from their orbits, a fact which modifies the chemical nature of the atom. The peculiar ability of x-rays to penetrate solid matter is supposed to be due to the power of these very short rays to pass through infinitesimally small spaces of solids.

Light on the retina also produces a photochemical action. The electromagnetic vibrations are changed in the rods and cones to nerve impulses. While the exact nature of nerve impulses is not known, they are accompanied by electrical action currents which can be accurately studied.

The importance of photography to clinical and scientific work cannot be overlooked. While the present fundus pictures are not entirely satisfactory, perhaps the use of waves other than those in the visible spectrum may give better pictures. For one thing, the use of invisible "light" would obviate the troublesome, almost painful intensities of illumination required in present fundus photography. But there are certain difficulties. In the ultraviolet region the shorter waves are absorbed by the cornea; nor do the longer ultraviolet rays reach the retina in quantity, for they cause fluorescence in the lens. Infrared photography is successful, but there is the danger in the eye of retinal damage by heat waves, and the color contrasts obtained would be very poor.

In heat therapy ophthalmology makes use of the next longest group of waves, the infrared rays. When absorbed, these rays increase the rate of molecular vibration; in other words, they increase the temperature. They can be harmful, and one must remember that they are refracted in just the same way as are the visible rays. Eclipse blindness is an example: infrared rays, focused on the macula, induce a lesion of heat necrosis. A glass suitable for watching sun eclipses must therefore remove the infrared rays as well as reduce the intensity of the visible light.

Finally may be mentioned that part of the spectrum in which the rays are of the same wave length as those used in the radio. Diathermy, a form of "wired wireless" corresponds in wave length to the ordinary broadcast band, which is in the neighborhood of 500 meters. Surgical and medical diathermy both are methods of creating heat by the passage of an electric current. The human body is a poor electric conductor, and to secure a current large enough to produce the desired heat a high voltage is necessary. That voltage however, is dangerous and will cause death when ordinary direct or alternating current is used. High-frequency current (radio-frequency) is peculiar in that it does not penetrate a conductor but travels only on its surface. Consequently when applied to the human body, these currents have no effect on the heart and nervous system. This fact explains why diathermy apparatus must be rather elaborate.

Whether the future will reveal other parts of the spectrum for application in ophthalmology is at present only speculative. Between infrared and the radio waves there is a vast band that lies unexplored. Perhaps somewhere in this region there may be waves that have a direct action on the nervous system and may be responsible for the occasional weird experiences that seem to suggest some direct interchange between human minds.

H. Rommel Hildreth.

SIGHT OF SCHOOL CHILDREN

In ophthalmology, as in other branches of medicine, "An ounce of pre-

vention is worth a pound of cure." Though some of the prophylaxis may well begin earlier than at school age, it is at school, for the first time, that children come directly under organized supervision, so that a universal check can be made on each individual. Public schools, and more tardily, private schools, almost everywhere, have introduced physical examinations of pupils. A part of these tests has usually been an ocular examination. The function of the school physician is to discover physical defects which primarily will handicap the child in his schoolwork. The study of these defects belongs to the family physician, who will examine the child thoroughly and recommend the care of a specialist when necessary.

It is very important that the school physician shall be familiar with the important defects of children's eyes and shall have a thorough understanding of hypermetropia, myopia, and astigmatism, with their possible effects on sight, health, habits, acquisitiveness, and disposition. He should know how to measure and record vision and should have some knowledge of the matter of fusion and extraocular-muscle functions.

The Joint Committee on Health Problems in Education discusses these and many other kindred problems in its excellent revision of "Conserving the sight of school children" (see review, page 475, this issue). Exact instructions are given for the taking of vision, and this test is recommended as a part of the yearly health test of each child. External diseases too must be looked for and strabismus noted. Fusion is discussed but no recommendation made as to testing for it, nor is this editor prepared to state that fusion tests or muscle tests should be added to the visual examination, though undoubtedly there would be found a few children in every large group who, though having good sight and no important error of refraction, were handicapped by less obvious ocular derangements. For vision taking, the Snellen charts, both the alphabetical and the illiterate E, are suggested, to be illuminated with seven to ten foot-candles.

Figures are given which indicated that probably one in eight school children has a real defect in vision. Obviously this is a matter of no small importance. Since the introduction of vision taking into the schools, there has been a noticeable decrease in the number of those who report in their 'teens or later with seriously impaired sight, and it seems not unlikely that there will be a reduction in the number of those afflicted with the ocular degenerations of later life when these tested children arrive at that period. We do not believe in the child's being made eye-conscious to the extent of being hypereye-conscious, but only good can come of an instillation into the mind of the child of the importance of his eyes and their reasonable care.

Another important chapter in this pamphlet is devoted to the proper illumination of the schoolroom; the shades; the placing of the desks; the posture of the student. Often the work is too near the eyes, the light is poor, and the child is seated at a table with head bowed over a book or sheet of paper and eyes held within a few inches of the work. These faults are by no means confined to the school; a frequent home posture is that of the child prone on the floor, with head propped in hand, comic sheet in close proximity to nose, and about one foot-candle of illumination penetrating the shadow of the head.

The pamphlet referred to is a valuable one; it was prepared under the direction of Dr. Thomas D. Wood and published by the National Society for the Prevention of Blindness. It is paper covered, comprises fifty-three pages, and may be purchased from the above-named organization for thirty-five cents; a good investment which can be recommended for any who have school connections.

Lawrence T. Post.

BOOK NOTICES

Partially sighted children. Report of Committee, to Board of Education. Paper, 200 pages, London. His Majesty's Stationery Office, 1934.

In 1931 Sir George Newman, Medical Officer of the Board of Education,

appointed a committee to "inquire into and report upon the medical, educational and social aspects of the problems affecting partially blind children." This committee, composed of four medical men, four educators, and three qualified persons connected with institutions for the blind, obtained information from a large group of experts in Great Britain, France, Belgium, Germany, and the United States. The reports give special acknowledgments to a list of 58 of these advisers, headed by the names of the late Mr. Treacher Collins, N. Bishop Harman, J. H. Fisher, and Sir John Parsons, of London, and eight other ophthalmologists. It is a report of highest value to those who are interested in the care of the eyes of school children. It can be recommended to teachers and school administrators who will have charge of partially sighted children.

The book starts with an introductory chapter dealing with the scope of the inquiry, the history of the subject, and the educational provision now made for partially sighted children, in England, Wales and other countries. Chapter 2 takes up the ophthalmic standards for selection of children who should attend special schools for the partially sighted. Chapter 3 deals with the medical care of these children, their ophthalmic supervision, attention to their general health, and cooperation between the school and the home. In chapters 4 and 5 different types of schools for these children are compared; and in chapter 6 educational problems are discussed, including curriculum, hygiene of the class room, and equipment. Chapter 7 is devoted to employment after leaving school. Chapter 8 is a summary of conclusions and recommendations that exhibit the practical British talent for getting results. Then there are 75 pages of appendices, largely giving detailed facts that have lead to these conclusions.

For the ophthalmologist who is interested in the care of the eyes of school children this book gives the most comprehensive survey of the whole subject that has yet been published. It gives due relative importance to errors of refraction, especially myopia and myopic astigmatism; but does not overlook the general health of the child, nor the question of his needs after he has left school. It may be obtained from the publication office, or in this country through the National Society for the Prevention of Blindness, in New York City.

Edward Jackson.

Conserving the sight of school children. A Report of the Joint Committee on Health Problems in Education. Thomas D. Wood, M.D., Chairman. Paper, 53 pages, illustrated. New York, National Society for the Prevention of Blindness, 1935.

This is a new edition of a report first issued years ago; revised by Annette M. Phelan, Staff Association of the National Society for the Prevention of Blindness. The committee which prepared it was composed chiefly of educators, school health officers, and administrators.

It is of interest to ophthalmologists, chiefly as demonstrating the wide interest that is felt in the sight of school children, by showing how educators think about the vital necessity of good vision for the pupil. It suggests the thought that, while some ophthalmologists are actively interested in the prevention of blindness, they have shown little general interest in the problem of securing for all children the best vision of which they are capable.

Edward Jackson.

Giza Memorial Ophthalmic Laboratory, Eighth Annual Report, 1933. Cairo, Schindler's Press, 1934. 168 pages, 9 plates, 37 figures, price 25 P.T.

The report of 1933 follows the form of previous publications. It contains many points of interest. Probably chief among these is that pertaining to the Research section, and of special value is the work referable to trachoma and B. granulosis.

The laboratory was visited by Dr. P. K. Olitsky and Mr. J. R. Tyler from the Laboratories of the Rockefeller Institute of Medical Research in New York. They worked for two months at

Giza, during which time it was possible to observe their technic with great detail. Three volunteers free from trachoma were inoculated by fresh strains of B. granulosis isolated locally and supplied by Tyler. "In the first two cases the inoculation was followed by a mild inflammatory reaction in the conjunctiva of the inoculated eye only, which gradually disappeared after a few days. After five weeks there was no further change in the condition. Results in both cases—negative. In the third patient. . . . When last observed at the end of nine weeks there was still no evidence of trachoma in either eye." In the last experiment the patient developed a spontaneous Koch-Weeks conjunctivitis in both eyes nineteen days after inoculation. This is of special significance in view of the impression of some workers that trachoma supervenes only where there is secondary inflammation.

Fresh attempts were made to isolate B. granulosis from tarsectomized tissue removed from 12 patients having active trachoma, with negative results. Further work on B. granulosis was then abandoned.

Certain conclusions relative to the questions of a virus as agent in the production of trachoma are considered. "The evidence against the elementary granules of Prowazek as the cause of Egyptian trachoma can be summed up as follows: They are not present in the uncomplicated disease in man, they are absent or unrecognizable in the experimental disease of monkeys. In filtrates, granules resembling them are not infective." These researches were largely done by Dr. Stewart following the methods of Olitsky and Tyler.

Another interesting section is that devoted to individual case reports. Two beautiful illustrations of Onchocerciasis of the macula are shown. The pathological department presents an interesting report.

One notable feature is the rarity of tuberculosis; only thirty-one cases have been found pathologically during the past twenty-one years. Of these thirteen were in the conjunctiva.

A continuation of the work on the acute ophthalmias is reported.

This volume is, like each of its predecessors, of great value.

Lawrence T. Post.

Bulletin de la Société Belge d'Ophtalmologie, number 69. (Transactions of the 69th meeting of the Society at Brussels.) Paper covers, 158 pages, illustrated. Brussels, Imprimerie Médicale et Scientifique, 1934. Price not stated.

This Bulletin contains the usual list of members of the society, and twenty-three articles and case reports (with discussions), abstracts of which will appear in the abstract department of the American Journal of Ophthalmology.

W. H. Crisp.

CORRESPONDENCE

On pronunciation

To the Editor:

Celebrated ophthalmologists who discuss with encyclopedic detail the available knowledge concerning chalazion, chalcosis, or blepharochalasis will often regularly mispronounce these very words, and medical students who learn much about the pelvis may nevertheless graduate without learning to pronounce correctly the name of the bone on whose tuberosity they sit.

The confusion arises from the varying pronunciation of the digraph "ch" according to its derivation. In the words cited above, the symbol is a transliteration from Greek roots, and is pronounced "k," as in the ophthalmic terms chemosis, choroid, chiasm, choroma, or as in words of more general use, such as character, architect, chemistry, chromium, chorine, chiropody, chamomile, chalcedony, chalybeate. The "ch" from Italian roots, as in maraschino, is similarly pronounced.

In words from the French the sound is "sh" as in chancre, charlatan, chauffeur, chivalry; while in words pronounced in the Anglo-Saxon fashion, "ch" has the more familiar sound of "tsh" as in chilblain.

James E. Lebensohn.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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4. OCULAR MOVEMENTS

Dobson, Margaret. **The management of a case of convergent strabismus.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 226-230.

Duc, C. **Solitary tubercle at the site of the third nerve nucleus.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 925.

A baby one month old, born of a tuberculous mother, showed xeroderma and malnutrition. The Pirquet test did not prove positive until the fortieth day. The child gradually grew worse and at three months showed radiographic evidence of pulmonary tuberculosis. At five months the child suddenly developed ptosis and divergence of the right eye but retained the pupillary reflex. There was no fever and no evidence of meningitis. A diagnosis was made of solitary tubercle in the anterior portion of the floor of the aqueduct of Sylvius, at the level of the anterior quadrigeminate bodies. Autopsy confirmed the previous diagnosis completely. (Three figures.)

E. M. Blake.

Ladekarl, P. M. **Pseudoparalytic divergent strabismus.** Acta Ophth., 1934, v. 12, pt. 3, p. 267.

A boy of ten years had paralysis of the left internal rectus. At operation for tenotomy of the left externus, a tight fibrous cord was found fixing the globe in an outward direction, and making adduction impossible. On division of this cord ocular movements became normal.

Ray K. Daily.

5. CONJUNCTIVA

Cornet, E. **Pathogenic and clinical study of trachoma and a new classification.** Bull. Soc. Franç. d'Opht., 1934 47th year, pp. 95-142.

This study is based upon three years of observation of trachoma in Indochina. A clear concise discussion of the etiology, pathogenesis, symptomatology, complications, and treatment is given. Excluding the etiologic microorganism there are in addition local and general factors predisposing to trachoma, of which conjunctival infection and diathesis are important. The glands of the conjunctiva are important as loci for the microorganisms of the disease. The new classification comprises five stages: (1) doubtful or latent, (2) confirmed, (3) complicated (pannus, keratitis, etc.), (4) precicatricial, and (5) cicatricial. A table of symptoms of each stage is included. The author finds fifty percent alcohol as a subconjunctival injection beneficial and at times uses expression, alcohol, and copper at the same treatment. The discussions of

symptomatology and treatment are especially thorough.

P. J. Leinfelder.

Cuénod, A., and Nataf, R. **Biomicroscopy of the conjunctiva.** (Discussion upon presentation of this monograph to the French Society.) Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 3-23. (See book review, Amer. Jour. Ophth., 1934, v. 17, Aug., p. 763.)

Favaloro, G. **A case of symmetric pseudoleukemic tumor of lids and conjunctiva.** Boll. d'Ocul., 1934, v. 13, April, pp. 475-487.

A woman of forty-five years was affected by big, indolent, freely movable, elastic nodules in the submaxillary, laterocervical, and other regions, and a marked tumefaction of the lids of both eyes, while the conjunctiva, of whitish-grey hyalinoid appearance, formed an elevated ring around the cornea. The author gives the histologic description of a specimen taken from one lid, and concludes that the case was one of chronic leukemic lymphadenosis. The patient recovered under roentgen therapy. (Bibliography, three figures.)

M. Lombardo.

Fiszman, T. **Bulboconjunctival recess.** Klinika Oczna, 1934, v. 12, pt. 4, p. 656. (See Amer. Jour. Ophth., 1935, v. 18 April, p. 403.)

Neame, Humphrey, **Conjunctival tuberculosis, with report of an unusual case.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 76.

An extensive historical review of conjunctival tuberculosis is given, with report of an eye with a granulomatous ulcer of the conjunctival tissue. The histology was typical of caseating tuberculosis, except for the absence of demonstrated tubercle bacilli.

Beulah Cushman.

Neuman, J. **Benzyl cinnamic acid ester in the treatment of trachoma** Klinika Oczna, 1934, v. 12, pt. 4, p. 699.

Daily intramuscular injections of one ampoule of Jacobsen's solution (a 3.2 percent oily solution of benzyl-cinnamic acid ester, which is the active ingredient of balsam of Peru), was used in ten trachoma patients with corneal involvement. Brief reports of these ten cases show the favorable effect of the treatment, attributed by the author to rise in constitutional resistance as an aid to energetic local measures.

Ray K. Daily.

Niklasson, H. **Primary tuberculosis of the conjunctiva with erythema nodosum.** Acta Ophth., 1934, v. 12, pt. 3, p. 244.

A boy of 12 years developed an ulcer on the conjunctiva of the right lower transitional fold, an enlarged preauricular gland, and erythema nodosum. The diagnosis of tuberculosis was made on microscopic examination of the excised ulcer and preauricular gland. (Illustrations.) Ray K. Daily.

Panico, E. **Biomicroscopy of steatosis of conjunctiva, cornea, and anterior chamber.** Boll. d'Ocul., 1934, v. 13, April, pp. 405-426.

The author describes the biomicroscopic aspect of steatosis of the palpebral and bulbar conjunctiva, of fatty degeneration as it appeared in four cases of old leucoma of the cornea, of arcus senilis, of the marginal dystrophy of the cornea, of xanthomatosis bulbi, and of steatosis of the anterior chamber. The steatosis manifests itself as spherules of varying size and of yellow color in the conjunctiva and cornea, as crystals of cholesterin in the deep layers of the cornea and in the anterior chamber, and as corpuscles of grey or yellow color in the arcus senilis. (Bibliography, three color plates.) M. Lombardo.

Sbordone, A. **A new prophylactic method for ophthalmia neonatorum.** Boll. d'Ocul., 1934, v. 13, April, pp. 427-432.

The writer mentions objections to Credé's method. He advises complete cleansing of the lids and surrounding parts and douching of the conjunctival sac with a half pint of ten percent hydrogen peroxide, together with the use of a polyvalent vaccine.

Szily, A. **Inoculation experiments with trachomatous material. A further contribution to the knowledge of follicle-producing agents.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 1 (Ill.)

Since the conjunctiva of animals almost always contains follicles, Szily selected for inoculation the interior of the eyes of rabbits, where under ordinary circumstances follicles never occur. In part of the cases, after intraocular inoculation of trachomatous material from man, specific products of reaction which could only be designated as trachoma follicles developed in the vitreous and choroid of rabbits. They seemed to remain confined to the inoculated eye, in contrast with those produced by material of sympathetic ophthalmia, which tends to spread from one eye to the other. If no microorganism can be found one may be justified in speaking of invisible follicle-forming agents. C. Zimmermann.

Tristaino, L. **Contribution to the knowledge of ocular localization of xeroderma pigmentosum.** Boll. d'Ocul., 1934, v. 13, April, pp. 488-498.

A man of twenty-four years showed a rough, red, dry skin on the face and the backs of the hands, covered with brown spots and warts. The upper right palpebral conjunctiva showed some papillae near the fornix, while the left one showed small whitish slightly bleeding nodules. Under the microscope a papilla of the conjunctiva was found, consisting of papillous tissue resembling carcinoma. (Bibliography.)

M. Lombardo.

Vannas, Manno. **Tuberculin allergy and ocular phlyctenulosis.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 49.

Phlyctenulosis is a disease of the conjunctiva and of the epithelial covering of the cornea, whereas typical tuberculosis is an intraocular disease (uvea and retina). Both affections seem to have a more or less common etiology. Vannas reports the observations of Haahti and Savona on 42,722 men of the Finnish army aged twenty and twenty-one years, on which cutaneous and intracutaneous tuberculin tests were made. During the ensuing year it was ascertained in what proportion the tuberculosis positive and negative individuals became affected with different diseases, including phlyctenulosis. The positive individuals had a much higher tendency to phlyctenulosis than the negative ones. Phlyctenulosis may set in from two months to several years after infection by tuberculosis. It arises not only with the primary form of tuberculous infection of the body but may also occur in the secondary phase and is related to the intensity of tuberculin allergy. C. Zimmermann.

Venco, L., and Castelli, A. **Clinical observations on the use of benzyl cinnamate in the treatment of trachoma.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 902.

The authors followed the technique described by Jacobson in 1932 in the treatment of thirty-three cases of trachoma in various stages of the disease. The treatment consists of daily injections of 1 c.c. of a two or three percent solution of the ether of benzyl cinnamate in sterile olive oil. The injections are made intramuscularly for twelve days, then, after a rest period of fifteen days, the course is repeated as indicated. In four cases the local condition grew worse, four cases remained unaltered, eleven showed slight improvement, ten definite improvement, and four great improvement.

E. M. Blake.

Wilczek, M. **Molluscum contagiosum and trachoma.** Klinika Oczna, 1934, v. 12, pt. 4, p. 711.

To illustrate how closely the irritative phenomenon caused by molluscum contagiosum on the lid border may simulate trachoma, the author reports the case of a student aged fifteen years whose right lids had been expressed for trachoma. Removal of a molluscum contagiosum found on the border of the lower lid resulted in complete recovery in two weeks. Ray K. Daily.

Zachert. **Chaulmoogra oil in the treatment of trachoma.** Bull. Soc.

Franç. d'Opht., 1934, 47th year, pp. 143-146. (See Amer. Jour. Ophth., 1934, v. 17, May, p. 452.)

6. CORNEA AND SCLERA

Biffis, A. **A contribution to knowledge of the curvature of the sclera in the anterior segment of the eye.** Ann. di Ottal., 1935, v. 63, Jan., p. 1.

The author studied over twenty human eyes. In none were the curvatures between the insertions of the recti muscles and the corneal limbus found exactly spherical. Frequent studies of the anterior segment of the sclera should be made during the period of adolescence and for a number of years following tenotomy of the recti or oblique muscles. In the adaptation of contact glasses these varying curvatures may cause imperfect coaptation of the glass to the globe. The writer suggests that an impression be taken of the globe, and the glass blown into this as a mold. (He does not say how this could be done.) (Bibliography.)

Park Lewis.

Biozzi, G. **Guttate cornea and associated findings.** Arch. di Ottal., 1934, v. 41, Dec., p. 357.

Two cases of guttate cornea are described in patients over seventy years of age. In one case a mild epithelial corneal dystrophy of Fuchs was present. The author regards the condition as a form of dystrophy in senile individuals.

H. D. Scarney.

Buchanan, L., and Michaelson, C. **The pathological sequel to a case of "family degeneration of the cornea" reported thirty years ago.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 110.

Two brothers with "nodular keratitis" had been seen in 1903 and reported on in a paper printed in the Ophthalmoscope, 1907, v. 5, p. 698.

The older brother died at the age of sixty-seven years and both eyes were examined microscopically. The principal changes were in the layers of the cornea immediately under Bowman's membrane, and similar changes were found in the deep layers near Descemet's membrane. They consisted of cloudy, degenerate amorphous areas lying between the corneal layers, pushing them aside, eroding them. In some places the mass was breaking through Bowman's membrane and eroding it. In the posterior layers there was great enlargement of the corneal cells with cloudy swelling of the protoplasmic contents and active nuclear division, this causing dilatation of the spaces in which the corneal corpuscles lay, with subsequent erosion and destruction of the corneal lamellae. The amorphous masses gave a positive reaction for hyaline degeneration. There was nothing to suggest congenital defect or vascular or neural change as a possible cause.

Beulah Cushman.

Busacca, A. **Trachoma of the lunula.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 789. (Ill.)

Busacca finds that the "lunula," as he calls the conjunctival upper region of the limbus, is very early invaded by the trachomatous process, at a stage where one cannot yet speak of the existence of corneal pannus. It appears edematous and swollen and its surface irregular from the development of small papillae. Actual trachoma granules are very rare at this stage. The infiltration, most intense in the connective tissue, is formed of polymorphonuclear leukocytes and a large number of polyblasts.

C. Zimmermann.

Engelking, S. **A case of intrascleral nerve loops.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 46. (Ill.)

A grayish-white nodule of the size of the head of a pin was noticed under the epithelium 3 mm. below the limbus of the right eye of a man aged fifty-five years. It was not movable with the conjunctiva, but was painful to the touch of a needle. After removal a deep bluish-black crater was left which corresponded to a scleral emissary vessel. Histologically the nodule was a portion of a ciliary nerve, the cylinder axes being clearly noticeable.

C. Zimmermann.

Fazakas, Alexander, **Keratomycosis periconica.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 798. (Ill.)

A soldier, working in the stables, presented a central round grayish-white corneal infiltration 6 mm. in diameter, conjunctival and ciliary injection, iritis, and minimal hypopyon. The abraded material demonstrated keratomycosis from a fungus of the periconia strain. Inoculations on the corneae of rabbits were all positive. C. Zimmermann.

Ferguson, W. J. W. **The treatment of relapsing corneal ulceration by modified peridectomy.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 102.

Of fifty cases of relapsing corneal ulcer and superficial vascularization of the cornea, forty-one were greatly improved and twenty-seven had no relapses after the use of the following treatment: The conjunctiva was cut around the edge of the cornea at the site of the leash of vessels and for 4 mm. on either side. It was then reflected back about 4 mm. and a portion excised. The underlying tissue was scraped from the sclera and a gutter was formed extending about 3 mm. from the limbus. Local anesthesia with four percent cocaine is sufficient in the first stage of the operation, but before the scraping the area to be treated is touched with solid cocaine.

Beulah Cushman.

Frykholm, Ragnar. **Familial degeneration of the cornea inherited through six generations, and observed clinically in thirteen members of the last three.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 76. (Ill.)

For the first time the disease has been proved in six generations. The genealogic tree comprises 42 persons, 21 men and 21 women, of whom at least 18 were diseased, 7 men and 11 women. This female predominance is in agreement with former investigators, but nothing speaks against a simple dominant hereditary type. The younger individuals presented more lattice-shaped, the older more nodular degenerations, which is further proof of the identity of the two forms of the disease.

C. Zimmermann.

Granström, K. **Parenchymatous keratitis in advanced age.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 122.

Collected at Serafim hospital from 1892 to 1933, two hundred cases of parenchymatous keratitis of established luetic etiology were classified relative to the age of the patients. Seven cases occurred in patients 37, 40, 41, 42, 61, 57, and 70 years of age respectively. In clinical symptoms, course, and prognosis they did not differ from the cases occurring in youth. Striped keratitis, which is rare in the parenchymatous keratitis of the young, was present in all seven cases. The luetic infection had been acquired in early youth, or was congenital. This supports Igersheimer's contention that parenchymatous keratitis is rarely caused by lues acquired in adult life. Ray K. Daily.

Kapuscinski, W. **Pericorneal and corneal cholesterol ring (arcus juvenilis corneae).** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 151-163.

A boy of eleven years showed the characteristic findings. Clinically the child was normal, but cholesterol was excreted in the urine. A biopsy specimen from the limbal region, stained with various fat stains, was much more cellular than normal, and collections of lipoid globules separated the lamellae. The author attributes the condition to some abnormality in cholesterol metabolism. P. J. Leinfelder.

Kokott, Werner. **The cleft-line picture of the sclera. Proof of the functional nature of the sclera.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 33. (Ill.)

Functional structures are designed to take up and release tensions created by the function. The power field of the sclera is the sum of the forces whose magnitude and direction are known. It can be ascertained mathematically and experimentally. The tension picture caused by intrinsic pressure in a body resembling the sclera is mathematically

presented, and that caused experimentally by the influence of the ocular recti.

C. Zimmermann.

Panico, E. **Biomicroscopy of steatosis of conjunctiva, cornea, and anterior chamber.** Boll. d'Ocul., 1934, v. 13, April, pp. 405-426. (See Section five, Conjunctiva.)

Pillat, A. **Keratitis psoriatica.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 751. (Ill.)

A man aged thirty-four years acquired in 1923 psoriasis on elbows, hands, and knees. Soon both eyes became inflamed without subjective symptoms, but they recovered with subsidence of the skin affection. Almost every autmun he had relapses of psoriasis, but no inflammation of the eyes until 1933. The ocular disturbance then resembled phlyctenular keratitis, and consisted in efflorescenses at the limbus with sectors of injected blood vessels and opacities mostly in the lower portions of both corneae, with normal sensibility. The condition, which seemed to argue for subepithelial origin of the psoriatic process, belonged to the manifestations of psoriasis of the skin, not of the mucous membranes. It resisted local treatment, but responded to the general therapy of psoriasis.

C. Zimmermann.

Rönne, H. **Treatment of tardive congenital syphilis seen in social light.** Acta Ophth., 1934, v. 12, pt. 3, p. 215.

The author believes that in adult patients with parenchymatous keratitis luetic therapy is of questionable value physically and definitely injurious psychically. He therefore confines syphilitic therapy to the period of corneal inflammation, and then uses it only if the patients can be held in ignorance of the diagnosis, and their social life left undisturbed.

Ray K. Daily.

Sala, A. **Bandlike keratitis and cornea guttata.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 860.

Sala observed a man aged fifty-four years whose vision had always been poor but much worse after an attack of undetermined inflammation eight years before. Beside the changes seen in the condition known as bandlike keratitis, there were also present the changes in the endothelium which Vogt has called cornea guttata. Both eyes were affected. The author believes that the bandlike opacity resulted from the endothelial defect, which allowed the calcium in the aqueous, more concentrated than normal, to pass through the parenchyma and affect Bowman's membrane and the epithelial layer. A very careful and full description of the biomicroscopic changes is given. (Two figures.)

E. M. Blake.

Schlodtmann, Walter. **Two rare clinical pictures in one patient.** (Iridodialysis, keratocele.) Zeit. f. Augenh., 1935, v. 85 Jan., p. 82. (See Section 16, Injuries.)

Shalom, E. S. **Intracorneal injections of cyanide of mercury in trachomatous pannus.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 107.

With a fine needle the author injects a few drops of a 1 in 1000 solution of cyanide of mercury between the layers of the cornea. The point of the needle passes 1 mm. into the corneal substance. The cornea becomes opaque and vascular but in two or three days it begins to clear. In twenty-five cases of severe trachomatous pannus, rebellious to other treatments, the pannus improved definitely in fifteen to twenty days. In twenty percent of the cases, recurrences occurred after a few months. While this method does not cure pannus radically, it affords a safe, simple, painless, inexpensive method of combatting pannus rebellious to other treatment.

D. F. Harbridge.

Thomas, J. W. T. **Experimental grafts of devitalized corneal tissue.** Trans. Ophth. Soc. United Kingdom 1934, v. 54, p. 119.

The author reports on the use in rabbits of corneal transplants, devitalized by heating, from other rabbits. The grafts united, although in course of time there was some thinning, and a linear

scar formed around each graft. There was a minimum of reaction in the eyes, and the grafts and corneae remained avascular. Beulah Cushman.

Thorson, J. A. **Nutritional xerophthalmia.** Jour. Amer. Med. Assoc., 1934, v. 103, Nov. 10, p. 1438.

A case of chronic adult type of xerophthalmia without hemeralopia is reported. The disease ran a protracted course for six years with a seasonal variation in severity. During the fall and winter months the patient consumed no vitamin A, but in the spring a few green vegetables and eggs became timely sight-savers. Abundant sunlight may also have been an important seasonal therapeutic factor.

George H. Stine.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Abramowicz, I. **Experimental cysts of the iris.** Klinika Oczna, 1934, v. 12, pt. 4, p. 611.

For the purpose of observing the changes taking place in the rabbit's ovaries after diagnostic injection of the urine of pregnant women, ovarian tissue was autotransplanted into the rabbit's anterior chamber. While assisting the gynecologist in this study, the author observed incidentally the reaction of the ocular tissues. Two types of cysts were found developing in the anterior chamber. Microscopic examination of the enucleated eyes showed that one type developed from free particles of ovarian epithelium attached to the iris, and the other within adhesions between the iris and the transplanted ovary. (Illustrations.) Ray K. Daily.

Borsellino, G. **Index of refraction of the aqueous humor and the calcium content of the vitreous body in parathyroidectomized rabbits.** Arch. di Ottal., 1934, v. 41, Dec., p. 293.

The author found the normal refractive index of the aqueous humor to be 1.335 in rabbits and the calcium content of the vitreous to be 0.09 mg. per gm. of vitreous humor. Following parathyroidectomy in rabbits, there was no change in the refractive index of the aqueous humor, but the average calcium content of the vitreous was 0.067 mg. per gm. of vitreous or an average decrease of 0.023 mg. of calcium per gm. of vitreous. (Photomicrographs.)

H. D. Scarney.

Bracci-Torsi, H. **Clinical and histologic contribution to cysts of the iris.** Ann. di Ottal., 1935, v. 63, Jan., p. 65.

After reviewing briefly the present views regarding traumatic cysts of the iris, the author reports a case with his histologic findings. He concludes that early intervention is desirable. (Bibliography.) Park Lewis.

Grönvall, H. **Conglomerate tubercle of the choroid.** Acta Ophth., 1933, v. 11, pt. 4, p. 465.

A man of twenty-one years developed a macular choroidal tubercle in the left eye. Following a course of tuberculin the eye remained quiet, with vision 5/36, for twenty years. Then suddenly the macular focus increased in size, and iritis, vitreous opacities, and retinal detachment set in. The enucleated eye contained a conglomerate tubercle, 12 by 14 mm. in size, perforating the eyeball at the posterior pole. (Detailed histopathologic report, photomicrographs, survey of literature.) Ray K. Daily.

Panico, E. **Biomicroscopy of steatosis of conjunctiva, cornea, and anterior chamber.** Boll. d'Ocul., 1934, v. 13, April, pp. 405-426. (See Section five, Conjunctiva.)

Rönne, H. **Clinical studies of luetic choroiditis.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 1.

This study is based on twenty-one clinical records containing drawings of the fundus and visual fields. Analysis shows that syphilis has a tendency to localize in large but well circumscribed areas of the choroid, and its most characteristic manifestation is a large sector-shaped atrophic area extending far into the periphery from the edge of the optic disc. While the lesions are protean in nature, predominant for lues are centrally pigmented areas arranged in rows; thread-like pigment collected

about the larger veins; grouped polygonal pigment spots; and pigment rings located in the nerve layer of the retina. Retinal optic atrophy accompanies congenital luetic choroiditis. Contrary to Forster's findings the author failed to find it in his cases of acquired syphilis. He found the incidence of the disease lower than that given by Forster, and there was no definite tendency to recurrence. These changes the author attributes to the effectiveness of modern early specific therapy. (Illustrations.)

Ray K. Daily.

8. GLAUCOMA AND OCULAR TENSION

Eerola, A. **Frequency of late infection after Elliot's trephining and Holth's iridencleisis.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 137.

In 5,616 Elliot trephinings and 954 iridencleisis operations, collected from the literature, late infection was four to five times more frequent after trephining than after iridencleisis.

Ray K. Daily.

Kaleff, R. **Conjunctivoplasty and transplantation of buccal mucosa in Elliot's operation.** Zeit. f. Augenh., 1935, v. 85, Jan., p. 73.

In order to avoid a thin cicatrix and the danger of secondary infection, the author places a conjunctival flap or a transplant of buccal mucosa over the newly made conjunctival flap after trephining according to Elliot's technique. It is also possible to apply the transplant two or three weeks after completion of Elliot's operation, or it can even be used as a method for safeguarding old thin cystoid scars.

F. Herbert Haessler.

Larsen, V. **The metabolism of glaucomatous patients.** Acta Ophth., 1934, v. 11, pt. 4, p. 494.

Ten patients with glaucoma were examined for thyroid insufficiency. The clinical examination as well as the basal metabolism test was negative.

Ray K. Daily.

Pesme, Paul. **A case of hydrocephalus with infantile glaucoma.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 259-267. (See Amer. Jour. Ophth., 1934, v. 17, Dec., p. 1184.)

Szokolik, E. **Ignipuncture of the posterior chamber in hypertension.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 801.

After preparing a conjunctival flap which is reflected on to the cornea, at 2 mm. from the corneal margin a dully glowing electrocautery 1 mm. wide is inserted almost parallel to the plane of the iris, and burns through the sclera and the ciliary body, pointing to the root of the iris, and the conjunctival flap is replaced without sutures. A fistula is formed as in Elliot's trephining.

C. Zimmermann.

Terson, A. **First notions and interpretations of hypertonus in glaucoma.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 270-276. (See Amer. Jour. Ophth., 1935, v. 18, Jan., p. 99.)

Vannas, M. **Cataract extraction in glaucoma.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 38.

This is a detailed analysis of one hundred extractions performed at the Elschnig clinic on eighty-five patients suffering from primary or secondary glaucoma. Generally speaking the visual results were better in primary than in secondary glaucoma and were closely related to the visual fields. The results were better relative to tension than relative to vision. The eyes with good vision had normal tension, but not all eyes with normal tension had good vision. Complications were more frequent in secondary glaucoma.

Ray K. Daily.

Weinstein, Paul. **The incidence of glaucoma.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 794.

Weinstein's statistics from the eye clinic of E. Grosz in the University of Budapest for the thirty years from 1904 to 1933 reveal 3,214 glaucoma patients, about ten percent of all eye patients, 1,264 being men (39.02 percent) and 1,950 women (60.68 percent). Out of 573 patients with acute glaucoma (17.8 percent) 116 were men (20 percent), 457 women (80 percent). Out of 300

cases of glaucoma simplex (19.5 percent) 172 were men (56.2 percent), and 134 women (43.8 percent). Glaucoma simplex generally appeared with arteriosclerosis, which predominated in men. The ages of most patients were from fifty-six to sixty-four years, and of those with glaucoma simplex from sixty-five to seventy-four. The majority of glaucomatous attacks occurred in the winter months. Glaucoma patients belong to the vasoneurotics. Their arterial walls are easily dilated or contracted by external influences, including psychic stimuli, caffeine-containing beverages, and meteorologic conditions.

C. Zimmermann.

9. CRYSTALLINE LENS

Cacioppo, S. **Operation for cataract according to its physical and anatomic character.** Ann. di Ottal., 1935, v. 63, Jan., p. 42.

Cortical remnants should be removed by corneal massage, not by introduction of a spoon or by irrigation, which is apt to excite a traumatic reaction.

To avoid accidents in unruly patients, in arteriosclerosis, and in the obese, the timid, alcoholics, cretins, and so on, the author prefers a section below with iridectomy to the usual section above. Relatively unsupported suggestions are offered against extraction in capsule, and as to the surgery of congenital cataract and luxated or subuxated lens.

Park Lewis.

Foster, J., and Benson, J. **The percentage incidence and surgical significance of the different forms of senile cataract.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 127.

Of 154 cases, 57 were cuneiform, 34 nuclear, 26 punctate, 9 cupuliform, and 28 of mixed form. The name is given according to the predominant finding. The incidence is also given according to age and to the frequency of dissimilar cataracts in the two eyes respectively. After operation the nuclear and cupuliform leave practically no cortex, although they may be relatively transparent. After a cuneiform cataract the cortex is greater in amount and is absorbed more slowly than in the previous type. The cortex remaining after a pure nuclear cataract seems to be particularly obstinate in its resistance to extraction. The slitlamp shows that there is no definite maturity of cataract as a whole, but that each different type has its own standard and mode of development, which determines the optimum time for operation.

Beulah Cushman.

Kalt, E. **My procedure for senile cataract extraction.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 195-204. (See Amer. Jour. Ophth., 1934, v. 17, Dec., p. 1186.)

Lindberg, J. G. **Bullous keratitis of both eyes after cataract operation.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 781.

After successive cataract extractions on both eyes, a woman aged seventy-five years developed a streaky bullous keratitis with changes of the epithelium, of Descemet's membrane, and of the endothelium, cure resulting from epithelial curettement nine months after operation on the first eye and two months after that on the second eye. Perhaps the eczema from which the patient suffered may have had an etiologic influence. C. Zimmermann.

Monjukowa, N. K., and Fradkin, M. J. **New experimental findings in the pathogenesis of cataract.** Graefe's Arch., 1935, v. 133, p. 328. (See Amer. Jour. Ophth., 1935, v. 18, Feb., p. 196.)

10. RETINA AND VITREOUS

Benedict, W. L., and Montgomery, H. **Pseudoxanthoma elasticum and angioid streaks.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 205-212.

Borsellino, G. **Index of refraction of the aqueous humor and the calcium content of the vitreous body in parathyroidectomized rabbits.** Arch. di Ottal., 1934, v. 41, Dec., p. 293. (See Section 7, Uveal tract, sympathetic disease, and color vision.)

Bucalossi, A. **Chorioretinal adhesion in superficial diathermic coagulation**

and chemical cauterization of the sclera. Ann. di Ottal., 1934, v. 62, Dec., p. 1039.

The author's experiments, made on normal eyes of rabbits and on one human eye necessarily removed for glaucoma, included superficial diathermic coagulation and chemical cauterization of the sclera. Histologic and ophthalmoscopic examination warranted the conclusion that by either method it is possible to obtain a chorioretinal zone of adhesion. In diathermic coagulation this is limited to the points of contact of the active electrode, whereas chemical cauterization gives an increased size to the zone attacked. The caustic method deserves further experiments for the case of extensive detachment with large or multiple tears in which it is necessary to obtain a greater zone of chorioretinal adhesion. (Bibliography, plates.)

Park Lewis.

Corrado, M. **A clinical contribution to the histopathology of retroretinal hemorrhage.** Ann. di Ottal., 1934, v. 62, Dec., p. 1009.

Retroretinal hemorrhage occurred sponaneously in a person of advanced years with clearly marked arteriosclerosis. Because of the possibility of a choroidal neoplasm the patient accepted enucleation. After discussing the differential diagnosis of conditions simulating choroidal sarcoma, the author concludes that except in rare instances we have no definite means of differentiating between retinal hemorrhage and a choroidal tumor. Park Lewis.

Dalsgaard-Nielsen, E. **Some cases of defect in the visual field from foreign bodies in the retina.** Acta Ophth., 1934, v. 12, pt. 3, p. 249.

This is a report of four cases of fine metallic foreign body in the retina, with photographs of the visual fields.

Ray K. Daily.

Giannini, D. **Alteration in the retinal pigment cells in a highly myopic eye and their importance in the pathogenesis of retinal detachment.** Ann. di Ottal., 1934, v. 62, Dec., p. 1024.

After discussing the most modern views on idiopathic retinal detachment the author gives the result of the histologic changes in the pigment epithelium in high myopia and argues the importance of this factor as a predisposing element in retinal detachment. (Bibliography.) Park Lewis.

Giannini, D. **The effect of certain pharmacodynamic substances introduced endonasally on the arterioretinal circulation.** Ann. di Ottal., 1934, v. 62, Nov., p. 938.

The effect was determined by the pressure shown in the retinal artery. The author concludes that the action of the substances employed, such as atropin and cocaine, was largely through the local sympathetic nervous system. (Bibliography.)

Park Lewis.

Hofe, K. vom. **Detachment of the retina and age.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 745.

Observations were made on one hundred patients with detachment of the retina within the last two years. The incidence rises with age without essential myopia, up to fifty years gradually, then more rapidly. Vogt is right in attributing just as important a rôle to age as to myopia. Twelve patients under thirty years were emmetropic. The author considers it probable that the changes are due to a congenital inferiority, perhaps circumscribed, of the retinal tissue. This was suggested in an emmetropic patient of thirty-four years who had no general affection but tears at symmetrical parts of the two retinas.

C. Zimmermann.

Jeandelize, P., Baudot, R., and Gault, A. **Treatment of detachment of the retina without visible tears or with uncertain tears by diathermocoagulation.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 338-351. (See Amer. Jour. Ophth., 1934, v. 17, Dec., p. 1188.)

Koyanagi, Y. **The secretory activity of the retinal pigment epithelium in retinitis exudativa (Coats).** Graefe's Arch., 1935, v. 133, p. 173.

Two eyes with exudative retinitis, from a fifteen-year-old boy and an eight-year-old child, were studied histo-

logically. Here as in the retinal detachment of nephritis, the subretinal effusion is almost exclusively secreted from the retinal pigment epithelium.

H. D. Lamb.

Lijo Pavia, J. **Berlin's edema and the chorioretinal changes following it.** Rev. Oto-Neuro-Oft., 1934, v. 9, Sept., p. 289.

Four cases of Berlin's edema evolved from light oculopalpebral trauma. One case was not followed up. In the others central vision was restored in 13, 25, and 65 days. Intensely pink spots were observed in addition to the greenish-white retinal cloudiness. These were believed to represent small hemorrhages; and to lie in the choriocapillaris, since the retinal vessels crossed them. Pigment migration was noted in all cases. It is a permanent sequel, generally near the disc margin. (Illustrated.) M. Davidson.

Lindberg, J. G. **Experimental observations on the blood pressure in the retinal veins of the rabbit with increased intracranial pressure.** Graefe's Arch., 1935, v. 133, p. 191.

The instrument used is a suction bell, which like a contact glass strongly adheres to the anterior surface of the eyeball. The greater the negative pressure in this suction bell, the more the instrument pushes on the sclera and the greater becomes the intraocular tension. Suction is produced through a mouthpiece connected with a mercury manometer. Ophthalmoscopic examination can be made. With increase of intracranial pressure the pressure in the retinal veins of the rabbit rose almost in direct proportion. After a long continued intracranial increase of tension, the tension in the retinal veins sank almost directly in proportion with the intracranial pressure, provided the latter did not rise above 50 mm. With intracranial tension of 40 mm. the difference of tension between the retinal arteries and veins appeared to be almost nil. At this critical point theoretically should appear the phenomena of choking in such animals as can show choking. When the tension in the cranial cavity reaches over 50 mm. anemia of the brain threatens, and then the general blood-pressure rises, so that the tension in the retinal arteries increases. Choked disc does not occur in spite of an intracranial tension of 40 mm. maintained for three hours, or of intracranial tensions of 60, 70, and even 80 mm., from which as a rule the experimental animal dies. H. D. Lamb.

Litauer, R., and Januszewski, Z. **A case of recurrent retinal and vitreous hemorrhages with retinitis proliferans, caused by polycythemia.** Klinika Oczna, 1934, v. 12, pt. 4, p. 618.

In a man of twenty-eight years the right eye was lost from intraocular hemorrhages, and was enucleated because blind and painful. Microscopic section showed a detachment of the retina, inflammatory changes, and intrabulbar hemorrhages. Recurrent intraocular hemorrhage in the left eye brought the patient to the clinic. In a search for the etiology, serologic and laboratory tests excluded tuberculosis and syphilis. Moderate hypertension and a blood examination led to the conclusion that the ocular symptoms were due to Gaisbock's polycythemia. Appropriate local therapy, bleeding, autohemotherapy, x-ray irradiation of the long bones and spleen, intramuscular injections of five percent sodium iodide, and subconjunctival injections of sodium chloride led to marked improvement in vision. The author points out the importance of finding the etiology, because drugs increasing the coagulability are contraindicated in polycythemia. (Photomicrograph.) Ray K. Daily.

Ramach, Friedrich. **The influence of shortening of the eyeball, according to Lindner, upon the palpebral fissure as well as upon the curvature and sensitiveness of the cornea.** Graefe's Arch., 1935, v. 133, p. 321.

Excision of an equatorial scleral band was recently recommended by Lindner in prognostically unfavorable cases of retinal detachment. (See American Journal of Ophthalmology, 1934, volume 17, page 187.) In twelve cases reviewed, no noteworthy disturbance of function of the eye was noted after this

procedure. Particularly observed were very slight enophthalmos or narrowing of the palpepral fissure, changes in curvature of the cornea, slight diminution in depth of the anterior chamber, and mild temporary disturbances of corneal sensibility. H. D. Lamb.

Ridley, Harold. **Some practical points in the treatment of simple detachment of the retina.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 101.

The author deals with localization with the ophthalmoscope and the visual field. A spreading detachment or an overhanging balloon detachment must be considered as a surgical emergency. Cases with much vitreous opacity are unfavorable. D. F. Harbridge.

Szily, A., and Machemer, H. **Treatment of detachment of the retina with electrolysis.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 721. (Illustrations.)

After having studied the electrolytic treatment of detachment of the retina experimentally as described in several previous articles, the authors applied it clinically within the last two years. Essentially the galvanic current acts chemically through the chemical bases and acids developing at the poles in the living tissue, and it differs in this way from diathermy, in which the formation of heat is the determining factor. The method consists of bipolar electrolysis, that is, both electrodes are used actively at very slight distance from one another, thus closely limiting the area of influence of the ocular tissues. The technique is described in detail, and is illustrated in four clinical histories. The results were favorable, but the authors reserve final judgment until after further experience.

C. Zimmermann.

Sorsby, Arnold. **Congenital coloboma of the macula: together with an account of the familial occurrence of bilateral macular coloboma in association with apical dystrophy on hands and feet.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 65.

The literature is reviewed. Twenty cases of bilateral and thirty-six of unilateral macular coloboma and three (possibly five) familial groups are considered. Attention is drawn to cases in which macular coloboma coexisted with typical choroidal coloboma or other atypical colobomatous defect. One suggestion that emerges is that nonpigmented colobomata tend to be more deeply excavated than pigmented. Studies in the pathologic anatomy of macular coloboma fail to indicate that congenital macular colobomata result from intrauterine inflammation. One familial group consisted of a mother and five children, all of whom showed bilateral pigmented macular coloboma; while associated with this defect was a rare skeletal abnormality known as apical dystrophy of hands and feet.

D. F. Harbridge.

Walker, C. B. **Concerning the technique of multiple micropuncture for the treatment of separated retina.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 246-256.

Wilczek, Marjan. **Retinal splitting (retinoschisis) with an opening.** Zeit. f. Augenh., 1935, v. 85, Jan., p. 108. (See Amer. Jour. Ophth., 1935, v. 18, Jan., p. 85.)

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Corrado, M. **The problem of the etiology of heredofamilial atrophy of the optic nerve. (Leber's disease.)** Ann. di Ottal., 1934, v. 62, Nov., p. 913.

The author presents the second genealogical tree in Italian literature on hereditary familial atrophy of the optic nerves. It includes the second and third generations in single hereditary line. In the first the author was obliged to depend upon the history furnished by the patients. He was able, however, to follow the characteristics of the disease in eight persons, five females and three males in which the transmission was through female carriers free from the malady, and in the third generation by direct transmission through the female manifestly affected. (Bibliography.)

Park Lewis.

Giannini, D. **The effect of disturbed circulation on the pathogenesis of functional and anatomic changes in the optic nerve and retina in poisoning from quinine.** Ann. di Ottal., 1934, v. 62, Dec., p. 1069.

In this group of experiments the chronic intoxication in dogs was produced by doses of quinine proportionate to the weight, the second dog being injected simultaneously with acetylcholine. The dog simply treated with quinine presented after four or five days an evident spasm of the retinal vessels with points of pallor in the papillae. In the other animal the retinal vessels in the papillae remained unchanged during the entire time of the experiment. The dog treated only with quinine became amaurotic, while the other showed no diminution of visual function. Histologic examination of the retina of the first dog showed marked changes in the ganglion cells with reduction in the caliber of the retinal vessels; whereas in the second dog no modifications were apparent. The author concludes that the visual disturbances from quinine are at least in part dependent upon spastic contraction of the retinal vessels. (Bibliography.)

Park Lewis.

Vannas, M. **Optic atrophy following birth injuries.** Acta Ophth., 1934, v. 11, pt. 4, p. 514.

Three cases are reported. Two patients had also strabismus and impaired pupillary reactions to light. The atrophy was primary, bilateral, but not equally advanced on both sides. The author points out that in optic atrophy in children the possibility of birth traumatism should be kept in mind. (Photographs.)

Ray K. Daily.

12. VISUAL TRACTS AND CENTERS

Fischer, Franz. **The cause of bitemporal hemianopsia in pregnancy.** Zeit. f. Augenh., 1935, v. 85, Jan., p. 88.

The findings on two patients in whom bitemporal hemianopsia occurred during pregnancy are described. Since no symptoms of pituitary tumor appeared early in the course, the hemianopsia was ascribed to pituitary hypertrophy of pregnancy. In one, the symptoms disappeared after delivery and recurred nine months later. In the other, signs of intracranial pressure soon followed. The diagnosis of suprasellar tumor was confirmed by autopsy in one case and biopsy in the other. Two questions arise; one, is there a pregnancy hypertrophy; and two, what is the relation of pregnancy to tumors of the hypophysis? A careful search revealed that the pertinent literature was not very large. The few reported cases which argue for the occurrence of pituitary hypertrophy during pregnancy are not entirely convincing, because it is always possible that the time of observation has been too short for a tumor to have become manifest. The number of cases in which pregnancy and pituitary tumor have been observed in the same patient suggests rather than proves that the coexistence is not accidental.

F. Herbert Haessler.

Font, M. M. **Thirty-nine cases of reading disability.** Delaware State Med. Jour., 1934, v. 6, May, p. 119.

The thirty-nine cases were referred to the mental hygiene clinic by the public schools of the state of Delaware. Only seven were not complicated by general scholastic retardation or by behavior problems. In many, definite physical and psychiatric causes were found. Four cases were treated. All are of too recent date to make any definite statement as to the possibility of their cure, although all show improvement. No attempt is made to summarize or evaluate the results.

M. E. Marcove.

McAlpine, Douglas. **Myelitis with blindness: acute disseminated encephalomyelitis.** Proc. Royal Soc. Med., 1934, v. 27, April, p. 662.

The author discusses the case history of a woman of twenty-two years who apparently recovered from acute disseminated myelitis. One month later blurring of vision was noticed, and in six months light perception remained in one eye, and ability to count fingers in the other. This progressed to complete blindness. Examination revealed bilateral optic atrophy. The Wassermann

was negative. The author believes that the lesion started in the center of the cord and spread outward and upward.
M. E. Marcove.

Velhagen, K., Jr. **The status of the problem of ocular symptoms in Basedow's disease.** Rev. de Ophth. de São Paulo, 1934, v. 3, Jan., pp. 139-143.

In a number of cases of epidemic encephalitis, in the parkinsonian period, the author encountered Graefe, Dalrymple, Stellwag, and Moebius signs in addition to the usual symptoms. Such signs, although more frequent in Basedow's disease, are found in various disorders of the central nervous system. They take their origin in the region of the third ventricle and the aqueduct of Sylvius, and their frequency in Basedow's disease suggests that the central nervous system is usually involved in this disease. W. H. Crisp.

13. EYEBALL AND ORBIT

Andersson E., and Ask, O. **Further studies on reimplantability of the fish eye.** Acta Ophth., 1933, v. 11, pt. 4, p. 411.

The left eyeballs were reimplanted in twelve fish. Three years later five of these fish were alive, and in three of them the implant had taken. The article is a detailed report, with photomicrographs, of examination of the implanted eyes and optic nerves of these fish. Grossly the reimplanted eyes were somewhat smaller than normal, and the lenses were opaque. Microscopically the retinal ganglion and nerve fiber layers were degenerated and the course of the optic nerve was occupied by a glial cicatrix. Ray K. Daily.

Colley, Thomas. **A case of inflammatory pseudotumor of the orbit.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 93.

In a boy aged thirteen years, two years previously the right eye had been excised because of a mass in the orbit, involving the superior rectus, the superior oblique, and the posterior pole of the eyeball. Microscopic section suggested a syphilitic origin, but the Wassermann was negative.

Proptosis of the left eye gradually developed, the eyeball being displaced downward and outward. A hard nodular swelling was observed under the inner part of the eyebrow. Exploratory operation was refused, potassium iodide and mercury were given. Because the boy did not tolerate the iodide, novarsenobenzol was administered. After six weekly injections some improvement was apparent. Eleven months later the patient could almost close the eyelids, there was good movement of the eyeball, and a nodular mass could just be felt. When last observed the eye and orbit were normal. Was the mass gummatous? D. F. Harbridge.

Kiehle, F. A. **Congenital cyst of the orbit.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 257-258.

Ladekarl, P. M. **Irregular colobomata.** Acta Ophth., 1934, v. 12, pt. 3, p. 255.

The literature is reviewed and five cases are described and illustrated. An unusual feature of one case was the presence of four colobomata in one eye, of which two were nevoid and two were excavated. The presence of both types in one eye suggests the possibility of a common etiology. Another drawing shows an area of syphilitic chorioretinitis within which were two atypical excavated colobomata. This case refutes the contention that excavated coloboma is caused only by an anomaly in the embryonic anlage.
Ray K. Daily.

Taylor, J. W. **Unilateral exophthalmos with case report.** Jour. Florida Med. Assoc., 1934, v. 20, Feb., p. 339.

Of three cases the first was due to emphysema which came on suddenly after blowing the nose and cleared up with compresses and pressure. Optic atrophy resulted. The second was due to an orbital abscess and cleared up after drainage. The third was due to a mucocele of the orbit which was removed by a Krönlein operation after a prolonged period of diplopia. This case also cleared up. M. E. Marcove.

Terry, T. L., and Mysel, P. **Pulsating exophthalmos due to internal carotid-jugular aneurism.** Jour. Amer. Med. Assoc., 1934, v. 103, Oct., 6, p. 1036.

The rarity of ocular involvement in this type of abnormal communication between the internal carotid artery and the internal jugular vein is pointed out. It is assumed that the exophthalmos was due to insufficient communication between the paired cranial sinuses. Thorium dioxide solution was of aid in locating the site of the aneurism. Complete relief followed ligation of the common facial, the jugular, and the lingual veins, and the common and internal carotid arteries. However, the exophthalmos persisted and central vision was reduced. (Four figures, discussion.)

George H. Stine.

14. EYELIDS AND LACRIMAL APPARATUS

Agnello, F. **Contribution to a better knowledge of Halbertsma-Gualdi's anomaly.** Boll. d'Ocul., 1934, v. 13, April, pp. 499-509.

Three children and their mother showed the root of the nose abnormally large and flat, with increased interangular distance. The author classifies these among the Halbertsma-Gualdi group of anomalies, stating that pathogenetically they result from abnormal development of the bones of the region during the first months of embryonic life. (Bibliography.)

M. Lombardo.

Anklesaria, M. D. **Cilia in the anterior chamber and traumatic cyst in the iris.** Indian Med. Gaz., 1934, v. 69, May, p. 259.

A perforating injury was caused by bursting of a soda-water bottle. The incarcerated iris was removed and a traumatic cataract developed. A discission was followed by entire absorption of the lens. A year later the patient was seen again because of recurrent attacks of iritis. At this time, five cilia were found in the anterior chamber and a small cyst of the iris was present. An operation to remove the cilia was refused. Five years later, the case was seen again because of a secondary glaucoma. The iris cyst had become very large. After the cilia and the cyst were removed the eye made an uneventful recovery.

M. E. Marcove.

Fiszman, T. **Whistling lacrimal canaliculus and pneumosaccus.** Klinika Oczna, 1934, v. 12, pt. 4, p. 671. (See Amer. Jour. Ophth., 1935, v. 18, April, p. 405.)

Marquez. **A case of typical syndrome of Mikulicz.** Bull. Soc. Franç. d'Opht., 1935. 47th year, pp. 84-94. (See Amer. Jour. Ophth., 1934, v. 17, Dec., p. 1192.)

Rodin, F. H., and Barkan, H. **Hereditary congenital ptosis.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 213-225.

Towbin, B. G. **The outcome of the implant in Schneller's operation.** Graefe's Arch., 1935, v. 133, p. 185.

Schneller's operation for entropion of the lower eyelid, proposed in 1873, consists of two horizontal incisions through the skin, muscle, and tarsus of the lower eyelid, the upper incision 1 to 2 mm. from the lid margin and the other 2 to 4 mm. further below. The uppermost and lowermost wound margins are next sutured together over the intermediate and thus buried flap of skin. Both in Gorki and in Kasan, the author has frequently observed after this operation a tumor of doughy consistency in the lower lid, just under the scar of the old suture line. At the outer end of the scar there is an opening, through which detritus exudes under pressure. Excision of the subcutaneous tumor was done in a woman aged thirty years on whom Schneller's operation had been performed seven years previously. Histologic examination showed that the tumor consisted of an epithelially lined cyst.

H. D. Lamb.

Van der Straeten and Appelmans. **Tooth in lid and palpebral coloboma.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 73-83. (See Amer. Jour. Ophth., 1934, v. 17, Oct., p. 992.)

Werner, S. **A double blepharostat of adjustable width for entropion operations.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 149.

This is a description with photograph of a lid clamp adjustable in width from 25 to 35 mm. It permits an incision to the angles of the lids, which cannot be done with the usual lid clamps.

Ray K. Daily.

15. TUMORS

Heijl, Carl, **A contribution to the study of ocular neoplasms.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 69.

Among the unusual specimens of the neoplasm material at the Serafim hospital in Stockholm and at the University Eye Clinic in Lund are an eye enucleated because of a sarcoma of the choroid in which was found also a nevus of the iris; a tumor of the ciliary body resembling in structure retinal glioma and teratoma; an eye enucleated for epibulbar carcinoma in which a very small choroidal tumor, probably a melanoma, was found on section; a highly myopic eye with a small choroidal melanoma, discovered accidentally; an eye with a sarcoma of the ciliary body and a melanoma of the choroid; two choroidal tumors presenting histologically mixed sarcomatous and carcinomatous structure; and a glioma cured with x-rays. The general impression is that melanoma or nevus of the uveal tract is more frequent than might be judged from former observations; and that melanoma may be the starting point of a malignant growth. (Illustrations.)

Ray K. Daily.

Kukan, Franz. **On lymphocytomatous ocular changes.** Klin. M. F. Augenh., 1935, v. 94, Jan., p. 62. (Ill.)

In a case of lymphosarcomatosis in a woman of sixty-five years with tumors of the eyes, glaucoma and a deposit of tumor cells in the anterior chamber as signs of a lymphocytic infiltration of the uvea deserved especial notice.

C. Zimmermann.

Stasinska, J. **Lipoma of the lids.** Klinika Oczna, 1934, v. 12, pt. 4, p. 627.

The patient was an undernourished farmer, thirty years of age. The growth was of six months duration, and involved both right lids to such an extent that the palpebral fissure was visible only nasally. The extirpated growth consisted of lobules of fat of various sizes. Microscopically the fat cells were irregular in size and the growth was poorly supplied with blood vessels. This, with the size of the growth and the undernourished condition of the patient, was the basis for diagnosis of a true neoplasm. Ray K. Daily.

16. INJURIES

Badot. **Slitlamp examinations of the sequelae of corneal injuries.** Bull. Soc. Franç. d'Opht., 1934, 47th year. pp. 148-151.

In a very short discussion the author describes the slitlamp findings in a noninfected laceration of the cornea, in a traumatic ulcer, and in pannus.

P. J. Leinfelder.

Farberov, B., and Medvedev, H. **Localization of intraocular foreign bodies by their relation to Tenon's space.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 3, p. 172.

After roentgenographing the case in the usual way the author injects lipiodol or a similar substance into Tenon's space, and roentgenographs again. The posterior segment of the eyeball is thus outlined, and differentiation between an extraocular and intraocular foreign body is facilitated. The method is harmless. Report of five cases illustrates its clinical value. (Roentogenograms.)

Ray K. Daily.

Favaloro, G. **A case of symmetric pseudoleukemic tumor of lids and conjunctiva.** Boll. d'Ocul., 1934, v. 13, April, pp. 475-487. (See Section 5, Conjunctiva.)

Gallenga, R. **The formation and spontaneous cure of retinal ruptures.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 956.

Gallenga's patient, aged forty-seven years, received a severe blow to the left eye and brow from a metal object. A small rupture was seen in the retina. The patient was put to bed and the fundus examined daily. In the course of a few days, two new spots of grayish infiltration appeared in the retina near the

disc and gradually developed into holes resembling the first rupture. One spot of infiltration did not go on to rupture. Gradually the holes became sealed down, and at the end of eighty days no tears were present. The author suggests that minute lesions in the chorioretinal capillaries occurred, appearing as ischemic areas; that autolysis resulted in the ruptures; and that when the circulation was reestablished cicatrization led to spontaneous cure. Other cases of spontaneous healing are gathered from the literature. (Four colored figures.)

E. M. Blake.

Hippel, E. **Can dazzling from short circuit lead to slowly progressing blindness?** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 86.

A case of malingering is reported with expert testimony by two surgeons and a final opinion by Hippel, giving a negative answer to the above question.

C. Zimmermann.

Kaelin-Sulzer, Marguerite. **An improvement in the technique of Vogt's method of skeleton-free radiography of the bulb. Creation of an exophthalmos.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 91.

The procedure described is, previous to making a Vogt radiograph, to produce exophthalmos by a retrobulbar injection of weak novocaine solution. Particles in more anterior positions may be rendered visible.

D. F. Harbridge.

Lin, C. K. **A case of chalcosis oculi.** Chinese Med. Jour., 1934, v. 48, Sept., pp. 965-968.

In a male patient aged seventeen years explosion of a brass shell caused two perforating wounds of the cornea. X-ray did not show foreign bodies in the globe. The eye was treated conservatively. Three and one-half years later there was a sunflower cataract and a bluish-green discoloration around a perforation of the lens. The vitreous was somewhat hazy. Three metallic foreign bodies were seen in the vitreous. Vision was 6/15. The aqueous was repeatedly withdrawn in an attempt to remove soluble copper. There was clearing of the vitreous and some disappearance of the lens opacity.

John C. Long.

Lurie, S. **The visual organ among tobacco workers.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 330.

This is a tabulated report of the ocular findings of a health survey of the tobacco industry, by a committee consisting of an internist, a gynecologist, an otolaryngologist, an ophthalmologist, and a sanitarian. The injurious agents in this industry are tobacco dust (which contains nicotin and pyridin), methyl alcohol, and carbon monoxide and carbon dioxide gases freed in the process of fermentation. Ninety percent of the workers are under forty years old, and the absence of older people is attributed to the exhausting effect of the occupation. Study of central vision, visual fields, and the fundus shows that the occupation has a deleterious effect on the visual organ, caused by mechanical irritation from tobacco dust and by general intoxication with nicotin and other products.

Ray K. Daily.

Majewski, K. **The effect of poison-gas on the eyes.** Klinika Oczna, 1934, v. 12, pt. 4, p. 707.

A review of the literature.

Ray K. Daily.

Marin Amat, M. **Foreign body in the vitreous. The danger of removal by the anterior route.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 250-257. (See Amer. Jour. Ophth., 1935, v. 18, Jan., p. 94.)

Nowkirischky, A. D. **A rare injury of the eye by stone.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 71. (Ill.)

A laborer was injured by particles of stone hitting the eye from an air compressor at a distance of four meters. Some pieces lying on the iris were removed through an incision in the cornea. The others were tolerated without reaction; which shows that in lesions of the eye by pieces of stone the treatment ought to be conservative.

C. Zimmermann.

Pallin, P. **Hemorrhage in the sheaths of the optic nerve and into the three coats of the eyeball.** Acta Ophth., 1934, v. 12, pt. 3, p. 220.

A man of twenty-one years fell backward on the street, and died six days later with symptoms of acute hemorrhagic encephalitis or of meningeal hemorrhage. Ophthalmoscopically there were found on the day of the injury large hemorrhages which covered the disc and macula. Histopathologic examination showed a subdural hemorrhage, without fracture of the skull, which extended along the sheaths of the optic nerve to the globe, and from the subdural space into the sclera. There were also small hemorrhages around the scleral bloodvessels, having no connection with the hemorrhage in the subdural space; and large intraretinal and preretinal hemorrhages as well as hemorrhages in the perichoroidal space, unconnected with the hemorrhages into the sheaths of the optic nerve. The author attributes the retinal hemorrhages to sudden rise in intracranial pressure and to the venous stasis associated with the intracranial hemorrhage. (Illustrations.) Ray K. Daily.

Ptashnik, D. **Industrial, agricultural, and miscellaneous ocular traumatism.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 369.

This is a detailed and tabulated study of 503 ocular injuries treated in 1932 in the Priluk polyclinic. The conclusions are that the metallurgical industry has the greatest number of ocular injuries, inversely proportional to the workers' years of experience. There is no relation between the degree of fatigue and the number of injuries. In industrial injuries the majority of the injured are between sixteen and thirty years of age, while all ages are equally affected in the agricultural and miscellaneous injuries. The eye less protected by asymmetric winking of the lids is injured more frequently.

Ray K. Daily.

Rattner, H. **Dermatitis of the eyelids.** Jour. Amer. Med. Assoc., 1934, v. 103, July 21, p. 180.

Four cases of dermatitis of the eyelids due to cosmetics are reported. One case was due to Godfrey's dye; one to a hair wave lotion; the third to a face lotion containing camphor and to a brown fur coat collar; and the fourth was due to cold cream. George H. Stine.

Sapir, I. **Ocular traumatism in agriculture (injuries with burrs.)** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 393.

Late every summer and in the autumn the agricultural population, especially large numbers of children and women, have their eyes injured by flying needles of dried burrs (Agrimonia eupatorium). At the same time the cattle of the region also suffer from similar epidemics. The author calls attention to this type of injury, because its prophylaxis can be undertaken only on a large scale and calls for eradication of the weed. Ray K. Daily.

Schlodtmann, Walter. **Two rare clinical pictures in one patient.** (Iridodialysis, keratocele.) Zeit. f. Augenh., 1935, v. 85, Jan., p. 82.

A blunt nonperforating blow on the eye resulted in total iridodialysis. The entire iris lay in the dependent part of the anterior chamber, slightly contracted and imbedded in a blood clot, yet its structures were clearly recognizable. In the course of his stay at the hospital, a keratocele was discovered in the other eye within a part of the limbus involved in dystrophia marginalis.

F. Herbert Haessler.

Sgrosso, S. **Traumatic myopia and Frenkel's traumatic syndrome of the anterior segment of the eyeball.** Boll. d'Ocul., 1934, v. 13, April, pp. 433-474.

The author reports seven cases of myopia after ocular trauma, in patients from seventeen to sixty-two years of age. The myopia was transitory, in one case persisting three months after the accident, and ranged from 2 to 5 D. The cause is assumed to lie in a lesion of the ciliary muscle and zonule, with lens changes. The cases of permanent myopia after trauma are due to dislocation of the lens toward the cornea. (Bibliography.) M. Lombardo.

Shapiro, A. **Ocular traumatic injuries.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 6, p. 571.

This is a comparison of the ocular injuries among metal and agricultural workers, showing the need for providing competent ophthalmologic service to the agricultural population.

Ray K. Daily.

Taradina, H. **Double perforation of the eyeball with retained normal visual acuity.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 396.

A report of three cases of double perforation of the eyeball by fine flying metal particles, localized by a roentgenogram in the orbit. The small size of the foreign body accounts for the comparatively slight injury and the retaining of normal visual acuity.

Ray K. Daily.

Thiel, R. **Ribbon-shaped chalcosis of the cornea.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 747.

A bronze worker and a copper printer showed on each cornea corresponding to the palpebral fissure a ribbon-shaped light gray opacity with fine yellow stripes in the anterior layers. The microchemical examination revealed copper in the epithelium. Abrasion improved vision only moderately as Bowman's membrane had been involved. The affection was caused by multiple superficial penetration of pieces of copper. C. Zimmermann.

17. SYSTEMIC DISEASES AND PARASITES

Agnello, F. **Primary leprous iritis.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 932.

Agnello gives a short and interesting historical review of leprosy and particularly of its appearance in Italy. He reports four cases of primary leprous iritis with little or no involvement of the other ocular structures. Apparently the organisms have suffered much reduction in virulence during the centuries, since the violent forms originally recorded are not seen today. (Four figures.) E. M. Blake.

Aubineau, E. **The clinical value of the Carabelli-Sabouraud tubercle in ocular hereditary syphilis.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 438-442. (See Amer. Jour. Ophth., 1935, v. 18, Jan., p. 95.)

Awerbach, M. **Surgery in the region of the macula.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 304.

The author reports two cases of cysticercus at the macula and three cases of myopic macular detachment operated on very satisfactorily by reaching the macula through an orbitotomy under local anesthesia. One incision is made in the outer half of the brow; another in the outer half of the lower orbital margin. The incisions are made down to the bone and are joined somewhat externally to the outer angle of the orbit. The contents of the orbit are retracted inward, exposing the tarso-orbital fascia, and the external rectus is pulled downward with a hook. Tenon's capsule is incised and the posterior portion of the eyeball is thus freely accessible for any operative procedure. Ray K. Daily.

Bellavia, A. **Ocular affections of dental origin.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 837.

The author conducted three series of experiments upon rabbit eyes. In the first, cultures made from the gingival structures in a case of pyorrhea alveolaris with recurrent keratitis were injected subcutaneously into rabbits. The results were negative. In series two the culture was made from an apical granuloma in a patient with iritis. In one rabbit conjunctival hyperemia, and in another a limbal phlyctenule and marginal corneal opacity resulted. In series three the culture was derived from an apical granuloma in a patient with recurrent corneal ulceration. Only conjunctival hyperemia occurred in one rabbit. Thus the experiments were entirely negative in the sense of reproducing the disease which existed in the patients, and showed only ocular tropism in an alternated form for the organisms used.

E. M. Blake.

Berens, C., Connolly, P. T., and Chapman, G. H. **Focal infection in diseases of the eye.** Rev. Cubana Oto-Neuro-Oft., 1934, v. 3, July-Oct., p. 82. (See Amer. Jour. Ophth., 1934, v. 17, Nov., p. 1094.)

Caramazza, F. **The biologic test in ocular diseases of suspected tuberculous nature.** Rassegna Ital. d'Ottal., 1934, v. 3, Nov.-Dec., p. 871.

The writer previously reported experiments in which the aqueous from cases of probably tuberculous anterior uveitis was injected into the peritracheal glands of guinea pigs, with not very conclusive results. In the present article he reports upon further work in which he injected an emulsion made from the inoculated glands into the peritracheal glands of a second animal. In four or five cases smears and sections showed acid-fast granules, almost uniform in size and slightly curved, which did not seem to be precipitates. The histologic changes in the gland consisted of hyperplasia of lymphoid tissue, and sometimes the presence of endothelial elements, often degenerated, and of an acidophilic exudate. The picture was similar to that observed after injection of the filtrable tuberculous virus, and the author suggests that in the future this reaction may prove to be a reliable test for tuberculous eye disease.

E. M. Blake.

Chardas, C. **Erysipelas of the anterior segment of the eyeball.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 5, p. 497.

In two cases of severe infection of the lids, conjunctiva, and cornea caused by streptococcus hemolyticus the diagnosis was made from a culture of the conjunctival secretions on blood agar. Both cases responded promptly to injections of polyvalent streptococcic serum.

Ray K. Daily.

Costa Lennon, R. **Ocular lesions in exanthematic typhus.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, Nov., pp. 595-616.

In forty-two cases such ocular complications as exophthalmos, retinal hemorrhage, choroiditis, retinal detachment, and papilledema were observed in patients with this disease. (Nine bibliographic references.)

Ramon Castroviejo.

Grönblad, E. **Changes in poikilodermatomyositis.** Acta Ophth., 1933, v. 11, pt. 4, p. 461.

The ocular findings in three cases are given. In one case there was marked peripapillary edema. Irregular whitish areas were situated deeply in the retina, without relation to its blood vessels. Peripherally there were several areas in various stages of atrophy, without pigmentation, involving at first the pigment epithelium and then the choroid. In the other two cases there was marked pupillary rigidity. In one of the cases the macula was very edematous.

Ray K. Daily.

Hossmann, Eva. **A case of disease of the ocular adnexa in agranulocytosis.** Zeit. f. Augenh., 1935, Jan., v. 85, p. 117.

After extreme swelling of the lids had somewhat subsided and inspection of the conjunctiva became possible, a fibrinous inflammation was discovered which suggested the necrotizing lesions often seen in the throat. However, the process cleared before actual necrosis took place.

F. Herbert Haessler.

Malek, I., and Reimova, M. **Cultivation of tubercle bacilli in eye diseases according to Löwenstein's method.** Ceskoslovenska Ofthalmologie, 1933, v. 1, no. 4, pp. 184-185.

This is a preliminary report of blood cultures taken from seventy-two patients with various eye diseases in which tuberculosis was suspected. Tubercle bacilli were found only in one culture from a recurrent iritis case. The authors feel that when such sensitive and difficult methods are used many experiments should be made and laboratory technique carefully checked before definite results are reported.

G. D. Theobald.

Saba, V. **Central echinococci with ocular complications.** Ann. di Ottal. 1935, v. 63, Jan., 13.

After reviewing the literature the author discusses symptomology, diagno-

sis, biology, development, and treatment. He reports in detail two cases with their complications, optic atrophy in the first and choked disc in the second. Echinococcic cysts like other cerebral neoplasms require exact neurologic localization with early diagnosis to make operative interference helpful. The author believes that the biologic information obtained from study of the echinococci could with advantage be used more frequently in neurologic involvements affecting the eyes. (Bibliography.) Park Lewis.

Samuelson, A. **Shrinking of the conjunctiva in dermatitis herpetiformis, with report of two cases.** Acta Ophth., 1934, v. 11, pt. 4, p. 501.

The ocular manifestations of this disease are conjunctivitis, conjunctival excrescences, photophobia, lacrimation, vesicle formation, cicatrization, intense shrinking with symblepharon, entropion, and blindness due to xerosis of the corneal epithelium. The ocular symptoms are identical with those of pemphigus, and the differential diagnosis has to be made by examination of blood, urine, and general metabilosm.

Ray K. Daily.

Szymanski, J. **Tuberculosis of the eye.** Klinika Oczna, 1934, v. 12, pt. 3, p. 555.

This is a discussion of the diagnosis and therapy of the disease, profusely illustrated with photographs of the anterior segment, photographs of the fundus. and photomicrographs of histopathologic specimens.

Ray K. Daily.

Vannas, Manno. **Tuberculin allergy and ocular phlyctenulosis.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 49. (See Section 5, Conjunctiva.)

Verdaguer, J. **Extraction of subretinal cysticercus in both eyes.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, Nov., pp. 622-626.

Removal of the cysts was successfully performed after careful localization by Gonin's technique for retinal tears in cases of retinal detachment. The vision before the operation was: O.D. hand movements at one meter; O.S. 1/15; after the operation: O.D. hand movements at two meters; O.S. 5/15. Treatment of the digestive tract eliminated an intestinal parasite which was diagnosed as Tenia solium. (Four illustrations.) Ramon Castroviejo.

Villani, G. **Biomicroscopy of the diabetic eye.** Ann. di Ottal., 1934, v. 62, Oct., p. 881; and Nov., p. 977.

The author examined forty-five diabetics with the biomicroscope. Sixteen showed alterations in the cornea, twenty-seven in the iris, seven in the vitreous and every patient in the lenses. In one there was marked hypertrophy of the caruncle. The corneal alterations consisted in extensive opacities in the superficial layers of the parenchyma, disciform or digitate and central or peripheral; cellular precipitates for the most part from the iris pigment; and changes in the iris. The preponderating changes in the iris were atrophy of the stroma with dystrophy of the pigment in the form of diffuse points on the anterior surface of the iris or accumulated in small elevated masses. There were four cases of iritis, two acute, of which one was of the hemorrhagic type and one recurrent; and two chronic with numerous synechiae on the posterior surface. In one case of hemorrhagic retinitis there was permanent vascularization, notably from the iris sphincter, with a distinctive glaucoma. Deposits of pigment were found in the anterior layers of the lens. Park Lewis.

Wright, R. E., Koman Nayar, K., and Nayudu, T. V. **Disturbances of the visual apparatus in the toxemias of pregnancy associated with eclampsia or the preeclamptic state.** Brit. Jour. Ophth., 1935, v. 19, Jan., p. 19.

Among the clinical records of twenty-eight south Indian eclamptic and preeclamptic patients the authors found in one case practical blindness associated with normal eye grounds following the eclamptic state, the presumption being that the injury had acted at a higher level than the third neuron. Loss of vision may also result from

injury acting at the retinal level either suddenly (usually recovered from in whole or in part), or gradually and permanently (due to late changes in the vessels). Minor injuries involving the retinal vessels without immediate interference with vision are relatively common. Detachment of the retina was not observed as a sequal to the toxemias of pregnancy.

D. F. Harbridge.

Zabugin, K. **Pathologic anatomy of severe luetic ocular affections, and the prevalence of syphilis in the black land area.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 319.

This is a tabulated report of the cases of parenchymatous keratitis seen at the various clinics in this region, and a detailed report of the histopathology of an eye destroyed by a gummatous process in the iris and ciliary body, and enucleated for cosmetic reasons.

Ray K. Daily.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Cherdakova, A. **Ocular affections among textile workers of the city of Ivanov.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 6, p. 558.

The most common ocular affection was conjunctivitis. The dust of the textile establishment was a secondary factor, the primary being the hygienic standard of living. Prophylactic measures should be directed chiefly towards raising this standard in factory and the home. Ray K. Daily.

Cousins, G., Monnier, A., and Mouton, M. **The use of selective illumination in reducing glare.** Bull. Soc. Franç. d'Opht., 1934, 47th year, 62-69.

The authors present a cadmium sulphide glass for use in automobile headlights. It is selective and transmits the red, orange, yellow, and green rays. The advantages of this selective illumination are augmentation of contrast with better visibility in fog, less ocular fatigue, decreased glare, shorter time for recovery from glare, and decreased reaction time. P. J. Leinfelder.

Danzig, H., and Steingart, D. **An attempt to standardize illumination in the printing industry on the basis of visual fatigue.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 5, p. 474.

Various intensities of illumination in printing shops were studied as to their effect on ability to maintain visual acuity; several typesetters and linotypists being tested every two hours during an eight-hour working period. The tests were conducted in a dark room with twenty-five minutes allowed for dark adaptation. Landolt's ring was the test object, and the findings were recorded on a kymograph. The tabulated findings show that 200 to 300 candle power at the working surface is the optimum illumination for printing shops.

Ray K. Daily.

Dukor, L. **Remarks on the terminology of pathological displacement of the eyeball and medical terminology in general.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 5, p. 460.

This is a criticism of the terminology used to designate displacement of the eyeball, and a plea for more adequate, accurate, and precise terms.

Ray K. Daily.

Klenova, E. **Visual acuity for white objects on a dark background, and its relation to the intensity of illumination.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 3, p. 217.

Six people were tested after dark adaptation, after adaptation to moderate light, and after adaptation to bright light. The tabulated and charted findings confirm Wilcox's finding that for distinction of white objects on a dark background there is an optimum illumination beyond which visual acuity falls. Eyes adapted to weak light reach the maximum visual acuity under lower illumination than dark-adapted eyes.

Ray K. Daily.

Koller, C. **Additional remarks on the beginnings of local anesthesia.** Wien. med. Woch., 1935, Jan., p. 7.

In this informal article, Koller tells of his early work on local anesthesia with Freud (at that time an assistant

in the neurology clinic). They worked together, and Koller was the first to use cocaine, although it was some time before Koller's priority was duly acknowledged. Theodore M. Shapira.

Kopp, I. **Prevalence of trachoma in Zaporozshe district.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 5, p. 483.

This is the first district where an ophthalmologic service was put into operation with a plan for the elimination of trachoma. The district comprises 20,000 people. In 1926 a survey placed the number affected at 4,000, with 21.6 percent among the German Mennonites and 5.5 percent among the Ukrainians. Tabulated records in 1933 show a close relation between the degree of elimination of trachoma and the degree of cultural, economic, and social advancement of the village. The greater percentage of trachoma in the German-Russian as compared with the Russian villages is attributed to fixation of medieval habits in what on the surface appears an advanced community. The German-Russians cling to the use of the common towel, common brass wash-bowl, large folding family beds, and keep rooms darkened day and night by constantly closed windows and shutters. Ray K. Daily.

Medvedev, H. **A survey of ophthalmologic service in the Ukraine.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 3, p. 244.

The organization of this branch of medicine in southern Russia is discussed. Ray K. Daily.

Pilman, H. **Ocular traumatism in the machine construction industry at Voronezsh.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 356.

From statistical survey of one year's ocular injuries with the object of developing a program of prophylaxis and elimination, the recommendations are for educational campaigns, raising of vocational efficiency, careful study of each injury from the etiologic standpoint by the medical personnel, and compulsory wearing of protective spectacles. Ray K. Daily.

Pilman, H., and Bologova, T. **Vocational selection of switchboard operators.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 4, p. 364.

From statistical study of eighty-one switchboard operators, with the object of establishing vocational requirements, the authors conclude that, because the retina of these workers is exposed to frequent and interrupted stimuli of light signals, and because the work requires a normal visual field, diseases of the retina and optic nerve are contraindications for choice of this vocation. So also are acute inflammatory diseases of the eye and its adnexa, and paralysis or paresis of the ocular muscles. Absence of binocular vision and low visual acuity have no effect on the vocational efficiency, and the authors suggest as the required visual acuity 0.4 with correction in the better and 0.1 in the weaker eye. Ray K. Daily.

Shagov, M. **Valentin Haüy.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 5, p. 505.

An appreciation of the man who initiated the movement for vocational reeducation of the blind.

Ray K. Daily.

Shubova, T. **The course of recovery of ability to maintain visual acuity after labor requiring visual effort.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 6, p. 568.

Studies as to maintenance of visual acuity were made on two engravers working for three and one-half hours with a plus ten loupe, in a room with an illumination of 135 candle power on the working surface. Landolt's ring with a 1 mm. opening, under 130 candle power illumination, at 2 mm. distance was the test object. The men were tested after various rest periods and the findings are tabulated and shown with graphs. Ray K. Daily.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth, 640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month.

Miscellaneous

The French Ophthalmological Society has requested Dr. Edward Hartman to present a report on the following subject, on the occasion of its 49th session: Radiography in Ophthalmology (with Atlas).

Dr. Edward Hartmann (2. Avenue Ingres xvi, Paris) would be very grateful for the following information: 1. reprints, or bibliographical references concerning one's publications; 2. x-ray pictures (which would eventually be published under your name in the Atlas) from your collection illustrating some rare condition. The Report is not limited to x-rays of the eyeball (foreign bodies, ossification, etc.) but will also include x-rays of orbital lesions (osteoma, etc.), x-rays of the ocular adnexae (lacrimal system for example), x-rays of neighboring regions, implications of which give rise to ocular manifestations (sinusitis, intracranial affections).

Dr. Alfred Bielschowsky gave a very instructive course on the ocular muscles, in New Orleans, the week of March 10. The attendance was approximately forty.

The Pan American Medical Association announces its Sixth Scientific Congress, to be held in the form of a cruise, sailing from New York on July 18 and returning on August 28. The itinerary includes Havana, Curacao, Trinidad, Santo Domingo and Jamaica in the West Indies, and Rio de Janeiro, Santos and Sao Paulo in Brazil. The medical activities will be divided into seventeen sections, representing all branches of medicine. Members of the medical profession are invited to join the Congress-Cruise with their wives and families.

Courses for the training of teachers and supervisors of sight-seeing classes will be offered at the 1935 summer session of: Western Reserve University, Cleveland, Ohio, June 24 to August 2; State Teachers College, Buffalo, New York, July 1 to August 9; Teachers College, Columbia University, New York City, July 8 to August 16. Details regarding the courses may be obtained from the university or college offering the course, or from the directors in charge of the courses, respectively: Olive S. Peck, Supervisor of Sight-Saving Classes of Northern Ohio, Board of Education, Cleveland, Ohio; Matie M. Carter, Supervisor of Sight-Saving Classes, State Education Department, Albany, New York; Winifred Hathaway, Associate Director, National Society for the Prevention of Blindness, 50 West 50th street, New York City.

The Orthopotic Clinic at the Episcopal Eye, Ear, Nose and Throat Hospital of Washington, D.C., was opened the first of March. Successful operation of this clinic has been going forward rapidly. It is hoped that scientific data of value may be derived from the treatment of squint cases. Accurate data are being kept on the progress and exacting requirements are made before a cure is substantiated.

Societies

The following tentative program has been announced for the meeting of the Association for Research in Ophthalmology, to be held at Atlantic City, New Jersey, on June 11, 1935:

At 9:30 A.M.

1. "Studies on the retinal circulation by direct microscopy," by Dr. Robert K. Lambert, New York, N.Y.
2. "Uveal sarcoma (malignant melanoma)," by Dr. Theodore L. Terry and Dr. Juanita P. Johns, Boston, Mass.
3. "Aniseikonia—a factor in the function of vision," by Dr. Adelbert Ames, Jr., Professor of Research in Physiological Optics, Dartmouth Medical School, Hanover, N.H.
4. "Measurement (roentgenometry) of the antero-posterior diameter of the eyeball in situ correlated with micrometer measurement following enucleation," by Dr. Dewey Katz and Dr. Alfred C. Ledoux, Divisions of Ophthalmology and Roentgenology, The University of Chicago.

At 2:30 P.M.

5. "The relation of vitamin A to anophthalmos in pigs," by Mr. Fred Hale, Chief—Swine Division, Texas Agricultural Experiment Station.
6. "A study of the pneumococcus group from the inflamed conjunctiva and lacrimal sac," by Dr. S. Hanford McKee, Clinical Professor of Ophthalmology, McGill University, Montreal, Canada.
7. "Streptococcal pseudomembranous conjunctivitis," by Dr. H. C. Kluever, State University of Iowa, Iowa City, Iowa.
8. "Lysozyme content of tears," by Dr. William M. James, Washington University, St. Louis, Mo.

The Oxford Ophthalmological Congress, 25th annual meeting, will assemble at Keble College, Oxford, on the evening of Wednesday, 3d July next, and the meeting will be held on the following Thursday, Friday and Saturday, 4th, 5th, and 6th July, 1935. A discussion on "Plastic surgery of the eyelids

and conjunctival sac" will be opened with an address by Sir Harold Gillies. The Doyne Memorial Lecture will be delivered by Mr. Malcolm Hepburn, and will be entitled, "The role played by the pigment and visual fields in the diagnosis of diseases of the fundus."

In addition to the foregoing, the following papers have already been promised: Mr. Tudor Thomas (Cardiff), "Corneal grafting"; Dr. Bernard Samuels (New York), "The recessus hyaloideus capsularis"; Mr. Frederick Ridley (London), "The permeability of the cornea"; Mr. Arnold Sorsby (London), "Dystrophies of the retina and of the choroid."

The International Association for Prevention of Blindness met in London, April 5. Dr. A. Franceschetti (Geneva, Switzerland) advocated measures to reduce hereditary blindness including the special training of physicians, particularly ophthalmologists, in genetics; the education of public health officials and the general public on this subject; a decrease in consanguineous marriages; the collection of precise and complete statistics; and the increased use of social workers in this field.

Dr. Park Lewis (Buffalo, N.Y.), vice-president of the Association, presided in the absence of Prof. F. de Lapersonne, of Paris, the president. Delegates attended from most of the thirty-four nations represented in the Association. Lewis H. Carris of New York City, managing director of the American National Society for Prevention of Blindness, represented the United States. Dr. M. Van Duyse of Ghent, Belgium, read a paper on "International classification of the causes of blindness." Dr. Van Duyse urged that statistics of the causes of blindness be collected uniformly in all countries, because of the importance of comparing them. These statistics, he said, should refer not only to those who are totally blind (persons incapable of perceiving light) but also to those whose visual power is so reduced that they are unable to perform work for which eyesight is essential.

The Kansas City Society of Ophthalmology and Otolaryngology took their post-graduate trip this year to Chicago, the 18th and 19th of February.

The Shreveport Eye, Ear, Nose and Throat Society elected the following officers for the coming year: president, Dr. John T. Crebbin, Shreveport, La.; vice-president, Dr. A. H. Mann, Texarkana, Texas; secretary-treasurer, Dr. J. A. Wilkinson, Shreveport, La. Meetings are held regularly at the Charity Hospital, on the first Monday of each month, at 7:30 p.m. except during the months of June, July, and August.

The Eye Section of the Philadelphia County Medical Society presented the following program on April 4: Dr. Aaron Brav, "Superficial punctate keratitis"; Dr. Mark J. Schoenberg (New York City), "An outline of a conception of glaucoma"; Dr. Joseph B. Wolffe, "The relation of certain general conditions to glaucoma"; Dr. Charles R. Heed, "The surgical considerations of glaucoma."

The Washington, D.C., Ophthalmological Society met on March 7, 1935. The program was as follows: Dr. Emory Hill, "A critical summary of eye surgery in 1934"; Dr. William H. Jenkins, "Exophthalmos of obscure nasal origin"; Dr. Frank Costenbader, "Case of bilateral optic atrophy, cause undetermined."

Personals

Dr. Harold F. Whalman announces the removal of his offices from suite 938, Roosevelt Building, to suite 1147, in the same building, Los Angeles.

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National Society for the Prevention of Blindness, Inc.
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